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THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Danielle Renee Forget Shield

Serial No.: 10/799,826

Filed: March 12, 2004

Title: Electronic waste management
system

§ Examiner: To Be Assigned
§
§
§ Group Art Unit: To Be Assigned
§
§
§
§ Attorney Docket No. 020976-00100
§

**PETITION UNDER 37 C.F.R. § 1.53(e)(2)
IN RESPONSE TO NOTICE OF INCOMPLETE NONPROVISIONAL APPLICATION**

MAIL STOP PETITION
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Applicant hereby petitions for review of the Notice of Incomplete Provisional Application mailed July 21, 2004. Applicant's application was accompanied by a declaration and drawings (and other material) and was sent via Express Mail. As a result, Applicant believes the Notice of Incomplete Provisional Application was mailed in error. Applicant has enclosed a copy of its entire March 12, 2004 submission and makes the showing required under 37 C.F.R. § 1.10 below. Applicant requests that the Office confirm receipt of each and every element included in its original deposit.

Applicant placed the number of the Express Mail mailing label on each piece of correspondence prior to the original mailing on March 12, 2004, as shown by the attached true copies of the utility patent application transmittal form and the first page of the specification. Applicant also includes a copy of the postcard receipt indicating the Office's receipt of drawings, an Information Disclosure Statement, an Assignment and Recordation Cover Sheet, Declaration, Power of Attorney, and the application, fee, and transmittal sheet.

The undersigned states that all application materials mentioned herein were among the original deposit materials in Express Mail mailing label no. EL179781635US deposited March 12, 2004. The undersigned further states that all copies attached hereto, including copies of the

original deposit materials and the copy of the returned postcard are true copies of the originally mailed correspondence and the returned postcard, respectively.

This paper is being filed promptly after the undersigned became aware that the Office may accord filing date other than the United States Postal Service deposit date. The Commissioner is hereby authorized to charge any requisite fee for consideration of this petition to Deposit Account No. 12-1322.

Respectfully submitted,

Date:

8/4/04

D. Brit Nelson

D. Brit Nelson

Registration No. 40,370

LOCKE LIDDELL & SAPP LLP
600 Travis, Suite 3400
Houston, Texas 77002-3095
Telephone No.: (713) 226-1142
Facsimile No.: (713) 223-3717

CERTIFICATE UNDER 37 C.F.R. §1.8

I hereby certify that this document and its attachments are being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to MAIL STOP PETITIONS, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 4 day of August, 2004.

Dated:

8/4/04

D. Brit Nelson



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APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
10/799,826	03/12/2004	Danielle Renee Forget Shield	020976-00100

22904
 LOCKE LIDDELL & SAPP LLP
 600 TRAVIS
 3400 CHASE TOWER
 HOUSTON, TX 77002-3095



CONFIRMATION NO. 8615

FORMALITIES LETTER



OC000000013287706

Date Mailed: 07/21/2004

NOTICE OF INCOMPLETE NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

A filing date has NOT been accorded to the above-identified application papers for the reason(s) indicated below.

All of the items noted below and a newly executed oath or declaration covering the items must be submitted within **TWO MONTHS** of the date of this Notice, unless otherwise indicated, or proceedings on the application will be terminated (37 CFR 1.53(e)). Replies should be mailed to: Mail Stop Missing Parts, Commissioner for Patents, P.O. Box 1450, Alexandria VA 22313-1450.

The filing date will be the date of receipt of all items required below, unless otherwise indicated. Any assertions that the item(s) required below were submitted, or are not necessary for a filing date, must be by way of petition directed to the attention of the Office of Petitions accompanied by the \$130.00 petition fee (37 CFR 1.17(h)). If the petition states that the application is entitled to a filing date, a request for a refund of the petition fee may be included in the petition. Petitions should be mailed to: Mail Stop Petitions, Commissioner for Patents, P.O. Box 1450, Alexandria VA 22313-1450.

- The application was deposited without drawings. 35 U.S.C. 113 (first sentence) requires a drawing "where necessary for the understanding of the subject matter sought to be patented." Applicant should reconsider whether the drawings are necessary under 35 U.S.C. 113 (first sentence).

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A copy of this notice **MUST** be returned with the reply.

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Applicant:	Shield	Appl. No.	To Be Assigned
Attorney:	D. Brit Nelson	Attorney File No.	020976-00100
Date:	March 12, 2004		

Utility Patent Application Transmittal; Fee Transmittal; Specification; Drawings; Information Disclosure
Statement w/References; Assignment w/Recordation Form Cover; Power of Attorney; Declaration; post
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DAFFENBERRY, LLC.

Applicant:	Shield	Appl. No.	To Be Assigned
Attorney:	D. Brit Nelson	Attorney File No.	020976-00100
Date:	March 12, 2004		

Utility Patent Application Transmittal; Fee Transmittal; Specification; Drawings; Information Disclosure
Statement w/References; Assignment w/Recordation Form Cover; Power of Attorney; Declaration; post
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LOCKE LIDDELL & SAPP

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UTILITY
PATENT APPLICATION
TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	020976-00100
First Inventor	Danielle Renee Forget Shield
Title	Electronic Waste Management System
Express Mail Label No.	EL 179781635US

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO:

Mail Stop Patent Application
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P.O. Box 1450
Alexandria VA 22313-1450

1. ☒ Fee Transmittal Form (e.g., PTO/SB/17)
(Submit an original and a duplicate for fee processing)
2. ☒ Applicant claims small entity status.
See 37 CFR 1.27.
3. ☒ Specification [Total Pages 35]
(preferred arrangement set forth below)
- Descriptive title of the invention
 - Cross Reference to Related Applications
 - Statement Regarding Fed sponsored R & D
 - Reference to sequence listing, a table, or a computer program listing appendix
 - Background of the Invention
 - Brief Summary of the Invention
 - Brief Description of the Drawings (if filed)
 - Detailed Description
 - Claim(s)
 - Abstract of the Disclosure
4. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets 24]
5. Oath or Declaration [Total Sheets 2]
- a. ☒ Newly executed (original or copy)
- b. ☐ Copy from a prior application (37 CFR 1.63(d))
(for continuation/divisional with Box 18 completed)
- i. ☐ DELETION OF INVENTOR(S)
Signed statement attached deleting inventor(s)
name in the prior application, see 37 CFR
1.63(d)(2) and 1.33(b).
6. ☐ Application Data Sheet. See 37 CFR 1.76

7. ☐ CD-ROM or CD-R in duplicate, large table or
Computer Program (Appendix)
8. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
- a. ☐ Computer Readable Form (CRF)
- b. Specification Sequence Listing on:
- i. ☐ CD-ROM or CD-R (2 copies); or
- ii. ☐ Paper
- c. ☐ Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

9. ☒ Assignment Papers (cover sheet & document(s))
10. ☐ 37 CFR 3.73(b) Statement ☒ Power of Attorney
(when there is an assignee)
11. ☐ English Translation Document (if applicable)
12. ☒ Information Disclosure ☒ Copies of IDS Citations
Statement (IDS)/PTO-1449
13. ☐ Preliminary Amendment
14. ☐ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
15. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)
16. ☐ Nonpublication Request under 35 U.S.C. 122
(b)(2)(B)(i). Applicant must attach form PTO/SB/35
or its equivalent.
17. ☒ Other: post card.....

18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.:

Prior application information:

Examiner

Art Unit:

For CONTINUATION OF DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

19. CORRESPONDENCE ADDRESS

☒ Customer Number: 22904 OR ☐ Correspondence address below

Name

Address

City

State

Zip Code

Country

Telephone

Fax

Name (Print/Type) D. Brit Nelson

Registration No. (Attorney/Agent)

40,370

Signature

Date

3/12/04

This collection of information is required by 37 CFR 1.53(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop Patent Application, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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FEE TRANSMITTAL for FY 2004

Effective 10/01/2003. Patent fees are subject to annual revision.

☒ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$ 452.00)

Complete if Known

Application Number	To Be Assigned
Filing Date	Herewith
First Named Inventor	Danielle Renee Forget Shield
Examiner Name	
Art Unit	
Attorney Docket No.	020976-00100

METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

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Deposit Account Name:

The Director is authorized to: (check all that apply)

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FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
1001 770	2001 385	Utility filing fee	385
1002 340	2002 170	Design filing fee	
1003 530	2003 265	Plant filing fee	
1004 770	2004 385	Reissue filing fee	
1005 160	2005 80	Provisional filing fee	
SUBTOTAL (1)			(\$ 385)

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

Total Claims: 23
Independent Claims: 2
Multiple Dependent: 21
Extra Claims: 3
Fee from below: 9
Fee Paid: 27

<u>Large Entity</u>		<u>Small Entity</u>		<u>Fee Description</u>
Fee Code	Fee (\$)	Fee Code	Fee (\$)	
1202	18	2202	9	Claims in excess of 20
1201	86	2201	43	Independent claims in excess of 3
1203	290	2203	145	Multiple dependent claim, if not paid
1204	86	2204	43	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Small Entity

Fee Code (\$)	Fee Code (\$)	Fee Description	Fee Paid
1051 130	2051 65	Surcharge - late filing fee or oath	
1052 50	2052 25	Surcharge - late provisional filing fee or cover sheet	
1053 130	1053 130	Non-English specification	
1812 2,520	1812 2,520	For filing a request for ex parte reexamination	
1804 920*	1804 920*	Requesting publication of SIR prior to Examiner action	
1805 1,840*	1805 1,840*	Requesting publication of SIR after Examiner action	
1251 110	2251 55	Extension for reply within first month	
1252 420	2252 210	Extension for reply within second month	
1253 950	2253 475	Extension for reply within third month	
1254 1,480	2254 740	Extension for reply within fourth month	
1255 2,010	2255 1,005	Extension for reply within fifth month	
1401 330	2401 165	Notice of Appeal	
1402 330	2402 165	Filing a brief in support of an appeal	
1403 290	2403 145	Request for oral hearing	
1451 1,510	1451 1,510	Petition to institute a public use proceeding	
1452 110	2452 55	Petition to revive - unavoidable	
1453 1,330	2453 665	Petition to revive - unintentional	
1501 1,330	2501 665	Utility issue fee (or reissue)	
1502 480	2502 240	Design issue fee	
1503 640	2503 320	Plant issue fee	
1460 130	1460 130	Petitions to the Commissioner	
1807 50	1807 50	Processing fee under 37 CFR 1.17(q)	
1806 180	1806 180	Submission of Information Disclosure Stmt	
8021 40	8021 40	Recording each patent assignment per property (times number of properties)	40
1809 770	2809 385	Filing a submission after final rejection (37 CFR 1.129(a))	
1810 770	2810 385	For each additional invention to be examined (37 CFR 1.129(b))	
1801 770	2801 385	Request for Continued Examination (RCE)	
1802 900	1802 900	Request for expedited examination of a design application	

Other fee (specify)

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$ 40)

SUBMITTED BY

(Complete (if applicable))

Name (Print/Type)	D. Brit Nelson	Registration No. (Attorney/Agent)	40,370	Telephone	713.226.1361
Signature		Date	3/12/04		

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

This collection of information is required by 37 CFR 1.17 and 1.27. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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APPLICATION FOR PATENT

INVENTOR: DANIELLE RENEE FORGET SHIELD

TITLE: ELECTRONIC WASTE MANAGEMENT SYSTEM

SPECIFICATION

FIELD OF THE INVENTION

The invention relates to collection and disposal of waste. More specifically, the invention relates to the management of a waste system that handles waste from producer
5 to disposal.

BACKGROUND OF THE INVENTION

Currently when a roll-off or tractor-trailer waste truck driver leaves a dispatch office to start a route, he is given a paper route sheet to direct his activities for the day. This is the first step in a very long paper trail that eventually leads to the driver getting
10 paid and the customer receiving an invoice, and the waste company collecting on services rendered. The second step in the process begins when the truck driver executes the route assignment, collecting additional pieces of paper ("tickets") along the route. When the driver hauls a box for a customer, he either hand writes a paper ticket and leaves a copy with the customer to record the activity or has no record that the activity occurred. In
15 some cases, the customer signs the ticket as a record of the haul. The driver must also note information such as the roll-off box number on his route sheet. Without an accurate record, the box can become lost. If the driver is transporting industrial waste, he must also have a manifest, which is a special document authorized and traceable by governmental agencies and created by the generator of the waste. This document must be
20 signed by the generator of the waste and taken by the driver to the landfill. When the driver gets to the landfill, he receives a landfill ticket. By the end of the haul, the driver is responsible for several tickets or other pieces of paper, which must be returned to the dispatch office in good condition. The current system allows for information errors (forgotten information, bad handwriting, language barriers, falsified documents, and so
25 forth) to accumulate through the creation and maintenance of data on these tickets. The

tickets contain important information, which places the responsibility on the driver to clearly and legibly collect accurate and complete information.

Further, the waste collection industry often charges for demurrage time, that is, an excessive amount of time that the waste truck driver is at a customer's site to collect the waste. Most customers are allowed a maximum amount of time that the driver spends on their site. Any time logged after this maximum amount of time is billed as demurrage time. The drivers often record the entire time that they are on-site as demurrage time. Existing systems rely on drivers to note how long they spend at a customer site for activities that can be classified as demurrage or billable time. If the driver is paid by the hour or by demurrage time, there is an incentive to overestimate the amount of time at the customer's site.

At the end of the day, these tickets are returned to the central office and used for many purposes including driver payrolls, customer invoicing, and third party payments. Some persons have estimated that the enormous number of tickets generated by waste hauling companies in the United States total about 160,000 tickets per day. Upon arrival at the office, a driver is debriefed to ensure that all paperwork was collected and is in order. The tickets are then routed to the payroll, billing, and box tracking personnel. The various personnel input the data captured on the driver's tickets to a variety of software systems to pay the driver, track the location of equipment, and bill the customer. In a lot of cases the same information is hand keyed into three different systems by three different people. This results in a very labor intensive effort and accuracy can be poor. In some cases, the customer can refuse to sign or sign a false name on the record of receipt and then the customer disclaims the services and refuses to pay. In other cases, a driver can erroneously allege a haul, resulting in an invoice to a customer and an understandable negative reaction by the customer to an improper invoice.

Thus, there remains a need for a more efficient system that substantially reduces or eliminates lost driver tickets, illegible tickets, tickets without appropriate customer signatures and required information. There remains a need for a more efficient system that reduces the need for a billing department to collect, file and make customer copies of the driver tickets to accompany the invoice. There also remains a need to automate the

processing of the information to make a seamless and verifiable billing and payment system for the drivers and the customers serviced by the drivers.

SUMMARY OF THE INVENTION

The present invention provides a system and method for electronically automating the solid waste hauling industry's existing paper system for tracking driver services. In at least one embodiment, the system directs the driver through his daily activities, allowing changes and corrections to customer service data along a route. This information is uploaded and converted to payroll data, customer service information, and invoicing for customers, among other aspects, periodically throughout the route or upon return to a home base after the route. The information that is collected on site and in real time into a unit available to the driver during the route can require specific and traceable entries that improve the accuracy and completeness of the data useful to the waste management system. The automation provides the information collected by a driver independently of additional clerks that heretofore have been used to input this information into a waste management system.

The invention provides a waste management system, comprising: a waste management electronic base system having a memory, processor, an input element, and an output element, the base system adapted to process waste management data for tracking a location of a waste storage unit, billing a customer associated with a waste removal, and paying personnel for services associated with the waste removal; and an electronic portable unit having a memory, processor, an input element, and an output element, the portable unit adapted to allow an operator during a waste removal to use the portable unit and to allow onsite input at a customer facility from preprogrammed queries regarding the waste removal and further being adapted to generate an output of the data to the base system for processing.

The invention also provides a method of managing waste removal, comprising: using a waste management electronic base system having a memory, processor, an input element, and an output element, to process waste management data, comprising tracking a location of a waste storage unit, billing a customer associated with a waste removal, and paying personnel for services associated with the waste removal; and using an electronic

portable unit having a memory, processor, an input element, and an output element, to gather onsite data for the base system, comprising allowing an operator to input onsite data at a customer facility into the portable unit from preprogrammed queries regarding the waste removal, and generating an output of the data to the base system for processing.

5 BRIEF DESCRIPTION OF THE DRAWINGS

A more particular description of the invention, briefly summarized above, can be realized by reference to the embodiments thereof that are illustrated in the appended drawings and described herein. However, it is to be noted that the appended drawings illustrate only some embodiments of the invention. Therefore, the drawings are not to be
10 considered limiting of its scope, for the invention may admit to other equally effective embodiments.

Figure 1A is an overall schematic view of one embodiment of the present invention and serves as an index guide for the remaining figures.

Figure 1 is an overall schematic diagram of one embodiment of the present
15 invention for the reporting, tracking, and output functions.

Figure 2 is an overall schematic diagram of an interrelationship between customers' sites, hauling company, drivers, and disposal locations.

(Figures 3, 6, 7, 20, and 25 are not present to allow the figure numbers to correspond to the numbering established in the index grid of Figure 1A.)

20 Figure 4 is an overall schematic diagram of one embodiment of the present invention regarding possible functions with a database at an office or other location.

Figure 5 is a schematic diagram of maintenance personnel functions.

Figure 8 is a schematic diagram of some exemplary features of the driver functions.

25 Figure 9 is a schematic diagram of the driver functions interface program and various aspects of adding a new customer site.

Figure 10 is a schematic diagram that generally relates to reporting functions that are uploaded to the database, shown in Figure 1.

30 Figure 11 is schematic diagram of a portion of the program relating to destinations and tracking of the waste storage unit.

Figure 12 is a schematic diagram of the portion of the program relating to the tracking of in-plant functions performed by the operator.

Figure 13 is a schematic diagram of additional features of the customer site functions portion of the program.

5 Figure 14 is a schematic diagram of a portion of the route sheet functions and help/forward utility functions.

Figure 15 is a schematic diagram of a portion of the program related to block functions in the box yard.

10 Figure 16 is a schematic diagram of a portion of the program relating to destination site functions for non-landfill destinations.

Figure 17 is a schematic diagram of a portion of the program relating to customer site functions being completed and going to destination site functions.

Figure 18 is a schematic diagram relating to customer site plant hauling functions.

Figure 19 is a schematic diagram of a portion of the program related to box hauls.

15 Figure 21 is a schematic diagram of a portion of the program relating to destination transfer station site functions.

Figure 22 is a schematic diagram of a portion of the program related to destination site functions and customer site functions.

20 Figure 23 is a schematic diagram relating to a portion of the program for manifests.

Figure 24 is a schematic diagram of a portion of the program related to box damage assessments.

Figure 26 is schematic diagram of a portion of the program relating to delivery of the box, file destination, and a possible pick up of an empty box.

25 Figure 27 is a schematic diagram of a portion of the flow chart that relates to decisions after the daily routes are completed.

Figure 28 is a schematic diagram of a portion of the program relating to transaction receipts and customer payments.

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides a significant improvement over the prior system in general use by waste haulers. While some specific aspects may be known in other industries, the waste haul industry has not been able to benefit from these aspects for a number of reasons, including a unitized format as provided by the present invention. While the motivation in the waste hauling industry to become more efficient is clearly a goal and the need has been long felt, the tools to accomplish that goal have simply not been evident to this industry.

In general, the basic waste management system allows for the following processes in conjunction with a base unit, a portable unit and programming associated therewith. The system can be altered to accommodate specific needs of a particular hauling operation and the below process is only one exemplary embodiment of the invention.

Routing information is uploaded to the waste management system, through for example, a data port link to a terminal or server unit or, in a wireless setting, through a company's existing radio system or mobile phone system. Most if not all of the information that would be found on a driver's paper route sheet can be loaded into a waste management system unit. The information can be transmitted in a secure format to ensure accuracy and eliminate access by those not on the system.

The driver uses a personal identification number to initiate his tasks for the day. Each transaction made with the waste management system can record a date and time so that activities of the driver can be tracked.

The driver begins his day with a vehicle pre-trip inspection record. When the driver is ready to begin his pre-trip inspection, he initiates that menu item on the waste management system. The waste management system directs the driver through the pre-trip questionnaire and requires acknowledgement of service needs. If vehicle maintenance is required, the driver can obtain a mechanics authorization before leaving with the truck. If a second truck is obtained as a replacement for the initial truck, the waste management system can require the driver to perform a second pre-trip report. Once the driver has completed an approved pre-trip inspection, he can initiate his daily route tasks. The waste management system can maintain the current and previous day's pre and post trip inspections for easy reference. Additional company information and

safety paperwork can also be incorporated into the waste management system to fit a customer's specific needs. The company information can include for example, particular instructions from the customer such as a preferred waste site to dispose of the waste.

5 When the driver is ready to begin his route, the waste management system allows him to view the day's schedule and begin the route when he is ready. Tasks do not have to be performed in order, unless specified by the dispatcher. If allowed, drivers have the option of choosing which customer they will service first.

10 The driver proceeds to a predetermined stop. The waste management system can navigate the driver through a series of questions to ensure the proper customer specific information is collected. The waste management system generally does not allow a transaction to be completed until all information is collected. If necessary, the driver prints a receipt for the customer or captures a signature. The signature can include a handwritten name of a person or any other identifying mark or signal, whether handwritten or electronic, including scanned codes, magnetic transmitters/receivers, fingerprints, retina scans, and other identifiers, whether of a person or a business entity. 15 The driver has the ability to add services at each stop to capture all information on services provided. The waste management system also has the ability to maintain electronic manifests if they are allowed by the corporate environmental department, a national agency such as the Environmental Protection Agency (EPA), or various states environmental agencies. 20

When the driver leaves a customer site, he can proceed to a variety of locations. If the driver is headed to a landfill, the waste management system allows for customer specific instructions at the landfill. If the customer specific task requires a trip to the landfill, the waste management system in one embodiment will not allow the transaction 25 to be finalized until the landfill ticket information is entered into the unit.

Further, regardless of where the driver goes, if he is carrying a box, the location of that box will be tracked until he tells the waste management system where he dropped that specific box. The result is that the location of the box is automatically tracked by the waste management system to show a location and a driver who took the box to that 30 location.

The waste management system can direct the driver throughout the route loop for assignments until all tasks are complete for the day. Additional information can be added manually or automatically to the unit if additional assignments are made throughout the day.

5 When the driver returns the waste management system to the dispatcher, information that has been collected all day is uploaded to a database system that interacts with the company's existing payroll and billing systems. In a wireless setting, the data could be uploaded throughout the day as the tasks are completed. Data requirements and uses for each of these systems is detailed in the following paragraphs:

10 Payroll – Drivers can be paid in a variety of ways: hourly, per haul plus demurrage time, per day, or by the cubic yard. The payroll database already includes the driver's names, their personal payroll rates, and on what basis their pay is calculated. Currently a clerk must enter the other information: number of hours, number of hauls, demurrage time, days worked, yards of waste collected, and so forth. The waste
15 management system can collect this information that can be uploaded to automatically calculate the payroll without necessitating a data-entry clerk for at least the bulk of the information. The data format can be altered to meet the needs of the payroll system or outside company providing this service.

Productivity Reports - The information captured by the waste management system
20 can be sorted and presented in a variety of ways. Since the waste management system records the time and date of transactions, this information can be withdrawn from database in a variety of formats to allow for more efficient management. The customer no longer has to rely on the driver to accurately record times for tracking purposes. The recorded information in the waste management system allows a company to efficiently
25 track the number of final hauls, deliveries, and other performance data by each driver and the time it takes to perform these tasks. Statistical information such as hauls per hour, productivity, downtime hours for maintenance, rental boxes, damaged boxes, and so forth can be readily calculated and provided in a report. Revenue information can also be integrated into this system to track revenue per transaction type, per driver, and other
30 measurements.

Invoicing – The information currently entered or verified in most systems includes the account number, dates, times, mileage, landfill used, material disposed of, disposal ticket number, disposal quantity, disposal billing quantity, type of container, final/swap/haul and return/delivery verification. The waste management system will
5 have collected all of this information en route and it can be automatically transferred into the accounting system. Invoices can be generated faster, more accurately, and can be automated. Further, an invoice can be generated at the customer's site, if desired. The backup information for the invoices can also be readily available and can be printed on demand from the waste management system. This improvement contrasts to the current
10 systems in that once a route sheet has been completed by the driver, the information is given to the accounting department to complete the transaction that was initiated by customer service. The accounting clerks must enter information from the drivers' route sheets and later produce an invoice, often inaccurate due to inadequate input.

Box Tracking – Most companies currently have a difficult time tracking the
15 thousands of boxes they own. As described above, lost boxes are not uncommon. The waste management system allows the driver to input the identifier for the particular box that the driver is hauling. In some embodiments, the identifier can be scanned into the waste management system unit if an electronic tracking method is utilized. In other embodiments, the driver can input the box number and location manually. The driver can
20 input this information when the box is picked up and when it is returned or otherwise relocated. This readily available information automatically updates the inventory management system at the end of the day or more periodically in a wireless setting. This enables a hauling company to know where its inventory is located. This information can be sorted by box number, box type, box size, location, customer name, driver last
25 associated with moving the box, and other fields. The present invention contrasts with current inventory management practices through spreadsheets and data entry from route sheets. Further, the waste management system can eliminate the need for a clerk to track box locations and track rented boxes as a separate effort.

There are many expansion possibilities for a tool such as the waste management
30 system. It is to be understood that the above aspects are only exemplary. Other embodiments are contemplated. For example, other embodiments can include multi-

lingual units, electronic manifests, container inventory management into and out of the storage yards, and immediate invoices that can be handed to a customer by a driver.

Having described the general system and method of the present invention, reference is now drawn to the flow charts for a more detailed explanation of the system and method.

Figure 1A is an overall schematic diagram of one embodiment of the present invention and serves as an index for the remaining figures. The index is useful in explaining the larger schematic and establishes each of the remaining figures in a grid pattern so that the relationship between the individual figures can be seen thereby. While the individual figures will be described in detail, it is to be understood that the individual figures relate to the overall schematic established in Figure 1A. Further, it is to be understood that the schematics described herein represent only one embodiment of the waste management system 2, shown in Figure 1A, as the invention may admit to other equally effective embodiments and are limited only by the claims herein.

Figures 1, 2, 4, 5, 8-19, 21-24, and 26-28 are exemplary schematic diagrams corresponding to the index grid pattern established on Figure 1A. The first row includes portions of the overall flow chart in spaces 1, 2, 4, 5 corresponding to Figures 1, 2, 4, 5. The second row includes flow chart portions in spaces 8-10 corresponding to Figures 8-10. Figures 3, 6, 7, 20, and 25 are not present to allow the figure numbers to correspond to the numbering established in the index grid of Figure 1A.

Figure 1 an overall schematic diagram of one embodiment of the waste management system illustrating the reporting, tracking, and output functions, database and base unit, and a portable unit with associated programs. One goal of the present invention is to include information obtained remotely by drivers into central database 100. For the present description, the terms "driver" and "operator" are used interchangeably. However, it is to be understood that the term "driver" is used broadly herein, and thus may include other functions besides simply driving a vehicle, as would be known to those with ordinary skill in the art. The database 100 generally receives input from the driver functions interface program 102. The database can be a centralized database or a plurality of databases that can communicate to one or more processors for integration therewith. The database 100 and driver functions interface program 102

communicate with each other and provide input and output between the program 102 and database 100, and related programs, to populate the database and provide information to the program 102. The term "program" is used broadly herein and includes, for example and without limitation, software, firmware and hardwired code, including routines, sub-
5 routines, steps, lines, and commands. In general, the program(s) of the present invention can reside in a base unit, a portable unit, modems, printers, websites, or other electronic devices to compute, relate, interact, received input, generate output, and perform the other functions described herein.

In at least one embodiment, the database and associated programs can be reside in
10 a base unit 96 and the driver interface functions can be housed in a portable unit 98. The base unit can be any computational electronic processor suitable for performing all or part of the duties described herein, including without limitation computers including desktops, laptops, notebooks, minicomputers, mainframes, super computers, and other electronic units. The portable unit can also be any computational electronic processor
15 suitable for performing all of part of the duties described herein with the additional feature that it is portable with the operator, or with the operator's vehicle, during the route and can include without limitation laptops, notebooks, personal assistance devices, and other portable electronic units.

Another source of input is a dispatch information interface 104 from an existing
20 system. An existing system is typically present in a waste hauling company or sometimes even from the customer. Thus, some input may be advantageous to help populate or update the database. The present invention can advantageously use an existing system to supply data and otherwise interface with the waste management system herein. Another source of input not shown is the general input provided by
25 programmers and other data entry personnel that could input generally more static information, such as information that could be entered at a base location.

Advantageously, the database can provide remote access 106 to the database 100. In general, the access availability is determined after verification to control the access, viewing and retrieval of any information. The database 100 can provide output in a
30 variety of ways. For example, the database 100 can provide output to enhance sales functions 108. The sales functions generally can allow access to the information based

on accounts by sales persons, customers, size, quantity of waste holes, disposal sites, and any other sorting of data, as can be available from the database 100. Further, the database 100 can be used to assist maintenance personnel functions 110 through various portions of a program. The maintenance personnel functions 110 can be useful for tracking the maintenance on the vehicles, alerting to any anomalies or tendencies of premature failures, scheduling of routine maintenance, and other maintenance functions.

Further, the database can provide data for output to an accounting system 112, a payroll system 114, and box tracking functions and box location database 116. Each of the various systems and databases 112, 114, 116, and others can be directed to at least one type of output, such as the report printing functions 118, another portion of the waste management system 2, shown in Figure 1A. The report printing functions 118 can produce reports, customer receipts, maintenance reports, invoices, and other features normally associated with the waste management system, in hard copy or electronic formats and communications.

In general, the present invention bridges the gap that heretofore has been unanswered. The management system can be managed virtually seamlessly through the driver functions interface and an electronic portable unit that accompanies the operator during the waste removal. The data gained from the operator during the route while performing the waste removal activities can be uploaded into the database with other related programs. From the database 100, the various functions throughout the waste management system including the sales functions, maintenance functions, dispatch information, output to accounting and payroll, and even tracking of boxes or other waste storage units, can be performed. From the various outputs and information available, sales, personnel, managers, and even customers with authority to access specific portions of the waste management system 2, can receive information, such as invoices and other reports.

This integration contrasts starkly with waste management systems prior to the present invention that rely upon a significant amount of copies of receipts, misdirected signatures, lost documents, and input from a variety of sources that were manually entered into database 100. Thus, the present invention automates the data input and retrieval through the interface with the driver functions interface program 102, described

below. While there has been a long felt need for such interface and automation, the waste management industry simply has not had the capability for such interface prior to the present invention. The present invention solves the long felt need as described herein.

Figure 2 is an overall schematic diagram of an interrelationship between customers' facilities, a hauling company, operators, and disposal locations. To better understand the overall waste management system, it may be helpful to briefly describe the flow of wastes from the customer facility to the disposal site. In general, one or more customer facilities 202, 204, 206 generate wastes for disposal. The customer facilities can be small shopping center drive-ins to very large industrial complexes, and others.

Typically, industrial waste requires environmental manifests to accompany the waste from a generator to handling to ultimate disposal with signatures at various steps of the process. The manifest is then submitted to environmental agencies, such as the federal EPA or an associated state-level agency. Obtaining correct signatures is very important to fulfilling the obligations required by the manifest. Other types of documents, signatures, and other input can also be required along the path from the generator of the waste to the ultimate disposal site. Often documentation, whether electronic or paper, is necessary for proper invoicing and payroll. Thus, the hauling company, customers, drivers, and operators of disposal sites are all interested in obtaining various portions of the information.

To remove the waste, a hauling company 208 transports the waste from the generator to the disposal site using vehicles and drivers/operators. The operators pick up the waste from the customer sites, attempt to obtain necessary documentation, and deliver the waste to a disposal site. In some cases, the disposal route is direct to the disposal site 212.

Depending on the particular waste, different disposal sites are needed. The disposal site in general is a landfill and can be a single or multi-function disposal site. For example, some disposal sites can accept construction and demolition waste, whereas other disposal sites can treat municipal waste. Still other disposal sites can treat industrial wastes that is nonhazardous, and there are sites for hazardous waste. In some cases, the same disposal sites can treat multiple types of waste.

Depending on the waste type and quantity, sometimes the operators 210 may deliver the waste to a transfer station 214. The transfer station 214 allows an accumulation 216 of the waste so that a larger and more economically efficient haul can be made to the disposal site 212.

5 Having described various generalities of the present invention shown in Figures 1-2, attention is now directed to details of the system and particularly the driver functions interface program 102 described in Figure 1.

Figure 4 is an overall schematic diagram of one embodiment of the present invention regarding possible functions with a database at an office or other location. For context, Figure 4 shows various aspects of the input to and output from the database 100 in Figure 1, but without either the maintenance personnel functions 110 or the driver functions interface program 102, where the maintenance personnel functions 110 and the interface program 102 is described in reference to the other figures. Similar elements are similarly numbered. Where logic flow lines exit or enter from the edges of the figures, 15 the flow line can be seen on adjacent figures. The figure numbers are referenced to the index grid, shown on Figure 1A. For example, the database 100 interfaces with the maintenance personnel functions 110 through the flow line that extends to the right of the page into Figure 5, described below. Also, the database 100 interfaces with the driver functions interface program 102 through the flow line that exits the bottom of the page of 20 Figure 4 and enters on Figure 9, as shown on the indexed layout in Figure 1A. Returning to Figure 4, the various inputs and outputs have been previously described in reference Figure 1. The database is populated and provides information for a variety of functions in the waste management system where the information primarily derives from the portable unit that is used by the operator while performing waste removals.

25 Figure 5 is a schematic diagram of maintenance personnel functions, described briefly in Figure 1. In general, the maintenance personnel functions 110 allow for input regarding vehicle examination, maintenance, repair, and associated functions such as timekeeping. For example, maintenance personnel can use the clock in functions 502 when beginning maintenance functions. The time for clock in (and later clock out) is 30 inputted into the maintenance personnel functions 110.

An examination 504 occurs on the vehicle by either the operator of the vehicle of the waste removal or by another person, such as maintenance personnel. The examination can proceed at any level, including a light visual inspection, a complete bumper to bumper inspection, or intermediate level inspections. In general, it is envisioned that the examination will proceed with a pre-established checklist. The checklist can appear on the portable unit 98, shown in Figure 1, that accompanies either the operator or the maintenance personnel. Thus, the portable unit could include preprogrammed queries that require operator or maintenance personnel input as to the particular condition. This input can be uploaded at some point into the maintenance personnel functions 110 and thence to the database 100 described in Figure 1 for tracking on a per equipment basis or other indicia.

If the vehicle does not need maintenance, then it is placed in the vehicle pool for use for waste removal or approved for current use by the requesting operator in block 508. The operator should complete a vehicle inspection report. If the vehicle does require maintenance, then a further examination and determination 510 is made if the vehicle can be used with minimal repair or if it has to be replaced for the particular route for which it was intended.

Part of the decision process is a further determination 512 of whether the vehicle repairs are necessary at that time or can be delayed. If they can be delayed, then the vehicle is placed in the vehicle pool 508. If they are presently necessary, then the repairs 514 are done. In some embodiments, it is required that the repairs be signed off when completed. Again, this information can provide traceability for the personnel, the hauling company, and other record keeping. When used with the portable unit 98, the information can be easily input into the database 100 described in Figure 1 contemporaneously or at later uploads.

After the repairs, a further determination 516 is made as to whether the vehicle is ready for use. At that point, if it is ready for use, it is placed back in the vehicle pool 508. If it is not ready for use, then a further determination 518 is made as to whether or not it can be further repaired to correct the remaining problems. If it can be repaired, it is placed into the examination and maintenance loop described above. If it cannot be repaired, then a procedure 520 is followed for taking the vehicle out of use. The

information can be linked with the inventory management system for scheduling purposes.

Figure 8 is a schematic diagram of some exemplary features of the driver functions. (Figures 5-7 are not present or numbered since no portion of the system flowchart appears in the corresponding spaces of the index grid of Figure 1A.) The driver functions 802 is linked to the driver functions interface program 102 described in reference to Figure 1 and Figure 9. The driver functions interface program 102 is linked to the driver functions 802 through the flow line entering Figure 8 from the right. The driver functions can generally begin with an operator clocking in for beginning the route time in block 804. Similarly, the driver can also view the day's route in block 806.

The operator can also make a determination 808 as to whether a vehicle condition report has been completed. If the vehicle condition report has been completed, then the program is directed to the route sheet functions 1402, shown in Figure 14 and connected to Figure 8 through the flow line exiting the bottom right of Figure 8 and passing through Figure 13 to Figure 14. If the vehicle condition report has not been completed, then the vehicle report is completed in block 810. In at least one embodiment, a portable unit contains preprogrammed queries that the operator can answer. For example, a logic tree of "yes" and "no" questions can be asked. Once a pretrip report is completed, the report can be accessed for reference from a help menu, forwarded to populate the database 100 described in reference to Figure 1, or other functions for reporting requirements. Further, the pretrip inspection report can be used to capture comments and signatures for traceability. In at least one embodiment, the driver route functions cannot be accessed by the operator until the pretrip report is properly completed.

As part of the pretrip report, it may become apparent that the vehicle needs further assistance. Thus, a determination 812 is made as to whether any vehicle repairs are necessary. If no vehicle repairs are necessary, then the program can be directed to the route sheet functions 1402, shown in Figure 14. The link from Figure 8 to Figure 14 is shown by the flow line exiting the center bottom of Figure 8, passing through Figure 13, and entering from the right on Figure 14 into the side of block 1402.

If the determination 812 indicates that vehicle repairs are necessary, then the operator can contact maintenance personnel and have the necessary repairs completed in

block 814. Generally, the operator will obtain the signature on the portable unit of the mechanic performing the repairs. A further determination 816 may be necessary as to whether a new truck is required when the repairs are substantial or when the previously completed repairs did not fix the problem. If a new truck is not required, the program
5 returns to the determination 808 as to whether the vehicle condition report is then completed and subsequent processes as described above after determination 808. If a new truck is required, then the operator checks out a new truck and re-starts the vehicle inspection report process in block 818.

Figure 9 is a schematic diagram of the driver functions interface program and
10 various aspects of adding a new customer site. The driver functions interface program 102 has been described in reference to Figure 1. The driver functions interface program provides a link from the database 100, referenced in Figure 1, through the flow line entering the top of Figure 9. The driver functions interface program 102 also is linked to an upload data process 1002, referenced in Figure 10, through the flow line entering the
15 right side of Figure 9. The driver functions interface program 102 further links to the start of the driver functions 802, referenced in Figure 8, through the flow line exiting the left side of Figure 9.

Further, Figure 9 illustrates a portion of a schematic when a new customer site is added, as a portion of the route sheet functions 1402, shown in Figure 14. In general, at
20 various times through the process, the operator can be directed to retrieve or haul waste from a new customer site, while the operator is performing route duties. The portable unit can allow such information to be input by the operator or through an electronic transmission to or from the portable unit, so that associated data can be collected for a new customer route and then uploaded immediately or later to the database 100, shown in
25 Figure 1. For example, the operator could be directed to add a new customer site route. To add such a route, the operator can access the customer site route functions 902 of the programming. The customer site route functions 902 in Figure 9 is linked to Figure 14 by the flow line from the route sheet functions 1402, referenced in Figure 14, entering the bottom of Figure 9.

30 A determination 904 is made as to whether a new customer route 904 is necessary. If one is not needed, then the program can link back to the route sheet

functions 1402, shown in Figure 14. If a new customer route is needed, then the operator can follow a preprogrammed form in block 906 to set up the new customer route, while the operator is in the field performing daily operations. After entering the new customer route, the program can return in block 908 to customer site functions 1302, referenced in
5 Figure 13.

Figure 10 is a schematic diagram that generally relates to reporting functions that are uploaded to the database 100, shown in Figure 1. In general, the present invention provides for uploading data to the database at the end of the route when the operator returns to base, such as the hauling company, or periodically during the route, for
10 example, through wireless transmissions. The following description generally uses the term "post trip," but it is to be understood that similar functions would be required for periodic reporting during the route, and thus the steps and functions described apply to such periodic reporting herein.

A portion in the program known as the post trip functions 1004 can be linked to
15 the route sheet functions 1402, shown in Figure 14. The flow line from the route sheet functions 1402 passes through Figure 15 and into the post trip functions 1004 through the flow line entering the bottom left of Figure 10. The post trip functions 1004 in at least one embodiment inquires whether a post trip vehicle condition report has been completed in block 1006. If the post trip vehicle condition report is not completed, then the portable
20 unit can provide a logic tree sequence of preprogrammed questions that the operator can answer and provide input in block 1008. Once the post trip vehicle condition report is completed, then a determination 1010 can be made as to whether a post trip report has been completed. Generally, the post trip report would include various aspects of the route, the operator, the waste removal, and other information of the waste management
25 system. If the post trip report is not completed, then the portable unit can provide various preprogrammed queries for the operator to provide input in block 1002. Once the post trip report is completed, the operator can clock out of the program in step 1014.

Various event times and responses to any queries are saved at the different input points along the route. In at least one embodiment, the operator's compensation,
30 customer invoice amounts, and other information can be calculated from the entries in the portable unit and any inconsistencies tracked. The data can be uploaded to the base unit

96, shown in Figure 1, either in a batch format or in periodic packets of data, as shown in block 1002. The upload in block 1002 can interface with the driver functions interface program 102, shown in Figure 9. The driver functions interface program 102 can further provide the information to the database 100, shown in Figures 1 and 4.

5 Figure 11 is schematic diagram of a portion of the flowchart relating to destinations and tracking of a waste storage unit. The flow line entering Figure 11 from the bottom center is connected in the flowchart to a destination site function for non-landfill destinations 1602, referenced in Figure 16. A determination 1102 is made as to whether the destination is a box yard in block 1102. The box yard is typically where the waste storage unit, generally denoted as a "box" herein (without limitation to the size, shape, or characteristics of the box), is stored for later retrieval and use at various customer facilities. If the destination is the box yard, the program is directed to the destination site functions for the box yard 1104. A determination 1106 is made as to whether the destination in the box is the final destination for the day. If so, then the box
10 can be delivered to the box yard, or left in the box yard if already present, and the program initiates a return in block 1114 to post trip functions 1004, shown in Figure 10. If the destination of the box in the box yard is not the final destination for the day, a determination 1108 can be made as to whether an operator should pick up a new empty box and deliver it to a customer facility. If the answer is yes, the portable unit can be
15 used to capture, in block 1110, a box identifier, such as identification number, for accurate billing and box tracking. In some embodiments, a bar code can be used and scanned into the portable unit. In other instances, other identification notice can be manually or automatically input, including keyboarding the information, using a touch screen, a wireless interface, such as an infra-red or electromagnetic transducer, a voice
20 recognition interpreter so the operator can dictate the box tracking number, preprogrammed cards that can be for example swiped through a card reader, combinations thereof, and other input formats as may be useful to the present invention. The block 1112 represents the input of such information as box identifiers, automatically or through operator input. The program can then initiate a return 1116 to the route sheet
25 functions 1402, shown in Figure 14.
30

Figure 12 is a schematic diagram of the portion of the in-plant functions performed by the operator. The functions illustrated in Figure 12 relate to a portion of the program described as the "customer site functions" 1302, shown in Figure 13. Through the customer site functions 1302 in Figure 13, a determination 1202 in Figure 12
5 can be made as to whether in-plant functions are needed. The term "plant" is used broadly and includes a variety of facilities, whether an industrial facility, packing facility, shipping facility, or other generators of waste, and thus, the term "facility" is used in the claims. In Figure 12, if there are no in-plant functions to perform, the program can return to the customer site functions 1302, shown in Figure 13. If there are in-plant functions,
10 the operator can stop and start the in-plant functions routines in block 1204 by various selections on the portable unit. Generally, the functions and services will be preprogrammed in the form of queries to which the operator can respond. In other instances, the operator may need to add comments or other information that may not necessarily be predetermined, depending on the circumstances. The portable unit can
15 provide for both types of input.

Once the operator or other personnel respond to the various input requests of the portable unit, the program can make a determination 1206 as to whether there are any additional in-plant functions. If there are none, the program is returned to the customer site functions 1302, shown in Figure 13. If there are, the system returns to the block 1204
20 for additional input. It is to be noted that the portable unit can also be used to calculate start/stop times through a clock interface, a description of activities, and a requirement for a customer signature, which may alleviate future customer billing disputes.

Figure 13 is a schematic diagram of additional features of the customer site functions portion of the program. The customer site functions 1302, described above in reference to the determination 1202 shown in Figure 12, form a portion of the program
25 that in general relates to the customer site operations, including for example, in-plant functions while the operator is present, calculation of demurrage time which may occur from delays, customer instructions, destination sites, plant hauling functions, and other aspects of the present invention. Further, the customer site functions 1302 can be linked
30 to the route sheet functions 1402, referenced in Figure 14.

In Figure 13, a determination 1304 is made as to whether an empty box is to be delivered. If an empty box is not to be delivered, then the program returns to the customer site function 1302. If an empty box is to be delivered, the program returns in block 1306 to the site functions for non-landfill destinations 1602, referenced in Figure 16 for further action. Such action can include, for example, the box can be returned to a box yard, described in reference to Figure 11.

Further, the customer site functions 1302 can also be used to determine demurrage time 1308. If the demurrage time is applied, such as from a delay in being able to access or empty the box at the customer facility, then the demurrage time can be calculated using either operator input or an automatic clock function for the program. Further, the portable unit can require operator input as to the reason for the demurrage time to provide a contemporaneous recordation of input, in reference to block 1310. This input can advantageously allow for correct billing and can include a customer sign-off to be incorporated therein to avoid subsequent billing disputes.

Figure 14 is a schematic diagram of a portion of the route sheet functions and help/forward utility functions. In general, the route sheet functions 1402, referenced above, provide a link to the customer site functions 1302, referenced in Figure 13, to driver functions 802, referenced in Figure 8, and to post trip function 1004, referenced in Figure 10. Further, the route sheets function 1402 can provide help and utility functions 1404. For example and without limitation, the help and utility functions can include help for questions on manifest requirements and necessary documentation 1406. The help and utility functions 1404 can also include help in block 1408 for questions on the operation and use of the portable unit, including frequently asked questions, key commands, and so forth. Further, the help and utility functions 1404 can allow the operator to access the pretrip report for inspection and other reasons in block 1410. Other help utility functions can be appropriate for particular situations.

Figure 15 is a schematic diagram of a portion of the program related to block functions in the box yard. A route functions for box yard 1502 portion of the program is related to the route sheet functions 1402, referenced in Figure 14. In general, the route functions for box yard 1502 allows a determination 1504 of whether the pick up by the operator is an empty box. If the pick up is an empty box, the programming can direct the

program in block 1506 to proceed to the destination site functions for box yard 1104, shown in Figure 11. If the box yard as a destination is not for the pick up of an empty box, a determination 1508 is made as to whether the driver/operator is at the box yard for the final destination of the day. If not, program can proceed to the route sheet functions
5 1402 for further directions, shown in Figure 14, this can result from dropping off an empty box before proceeding to the next item on the route sheet. If the destination of the box in the box yard is the final destination for the day, the program can return in block 1510 to the post trip functions 1004, shown in Figure 10.

Figure 16 is a schematic diagram of a portion of the program relating to
10 destination site functions for non-landfill destinations. The destination site functions for non-landfill destinations 1602 is linked to the program in at least one embodiment by determining if the destination is a box yard, as is described above in reference to Figure 11. The destination sites function can include a determination 1604 as to whether demurrage time is applicable at the destination site. If the demurrage time is
15 inapplicable, the program returns to the destination site functions for non-landfill destinations 1602. If demurrage time is applicable, the operator can start and stop demurrage time, or the portable unit can be programmed to automatically start and stop demurrage time, as shown in block 1606. Further, the program can require input by the operator or other personnel as to the reason for the demurrage. In general, the demurrage
20 time can be accurately calculated by using the start and stop time entered at the site. Further, a customer signature can be requested, which may alleviate future customer billing disputes.

The destination site functions for non-landfill destinations 1602 can also include a determination 1608 as to whether the destination is a new customer site. If the
25 destination is not a new customer site, the program can return to the destination site functions for non-landfill destinations 1602. If it is, the program can return, in block 1610, to the route sheet functions 1402, shown in Figure 14.

Figure 17 is a schematic diagram of a portion of the program relating to destination site functions and some of the flow lines are linked to Figure 13. If the
30 customer site functions are not complete, the program can return to the customer site functions 1302 in Figure 13 for completion. The completion can include, for example,

calculation of demurrage time which may occur from delays, customer instructions, destination sites, plant hauling functions, and other features. In general, if the customer site functions are incomplete, the program can be directed in block 1710 to the customer site functions 1302, referenced in Figure 13, for completion. If the customer site functions are complete, the program is directed to a portion of the program termed the "destination sites functions" 1704. Upon entering the destination site functions 1704 portion of the program, a determination 1706 is made as to whether the destination is a landfill. If the destination is a landfill, the program can proceed to a program portion of destination site functions landfill 2202, shown in Figure 22. If the destination is not a landfill, the program can be directed, in block 1708, to the destination site functions for non-landfill destinations 1602, referenced in Figure 16. Such considerations can include for example, proceeding to a box yard, a next customer site, or a transfer station, described herein.

Figure 18 is a schematic diagram relating to plant hauling functions. In general, the customer site functions 1302, shown in Figure 13, can include plant hauling functions, shown in Figure 18. In one embodiment, the program can provide for a determination 1802 as to whether there are specific plant hauling functions at a particular customer site. If there are no specific plant hauling functions, the program can proceed or otherwise be directed to the customer site functions 1302, shown in Figure 13. If there are plant hauling functions, in at least one embodiment, a determination 1804 can be made as to whether the box is a lease box. If the box is a lease box, a determination 1806 can be made as to whether the particular customer or waste hauler has a policy to exchange lease boxes for one or more waste hauler's boxes. If such a policy exists, the operator can follow the protocol for the exchange and capture a box identification number. Further, the operator or program can flag the box in the system regarding the exchange. The program is then directed to the program portions, referenced in Figure 19.

Figure 19 is a schematic diagram of a portion of the program related to box hauls. Continuing from Figure 18, a further determination 1902 is made as to whether the box haul is a final box haul. If the box haul is final, the portable unit can capture a box identification number, and note that the haul is a final haul in block 1904. The information can be used to determine a box's beginning location and final location to

assist in the box inventory functions of the waste management system. Further, block 1906 can represent a push button or other activation by the operator or through automatic input to capture the box identification and verify the box size. The program continues to Figure 24, where a determination of manifesting is made.

5 Returning to Figure 19, if the box haul is not the final box haul, then a determination 1908 is made as to whether to exchange the hauled box. For example, the operator may haul an empty box, leave the box, and take a full box. If the box is not to be exchanged, the portable unit can capture the box identification number, if not already captured, for accurate billing and box tracking purposes, in block 1910. If the hauled box
10 is to be exchanged, the portable unit can capture the box identification number, if not already obtained, and note that the hauled box is to be exchanged. In block 1912, the information can also capture the box identification number for the exchange box that is left on site, and there after capture of the beginning location of the removed box and its identification number, and subsequently capture the final box location for box inventory
15 purposes.

Digressing from the order of figures, attention is now directed to Figure 24 to complete the portion of the box description of Figure 19.

Figure 24 is a schematic diagram of a portion of the program related to box damage assessments. Whether the exchange box is hauled or left, a determination 2402
20 can be made as to whether the box is damaged. If the box is damaged, the portable unit can capture the box identification, if not already captured, and note that the box is damaged. The operator can flag the information, based upon the severity of the box damaged, to exchange the box with a replacement box in block 2404 in a timely fashion. If the box is not damaged, the system captures the box identification in block 2406 and
25 verifies the box size to aid in tracking. A further determination 2408 can be made as to whether manifesting is required. The sequences of "yes" and "no" will be described in more detail in reference to Figure 23.

Figure 21 is a schematic diagram of a portion of the program relating to destination transfer station site functions. In general, the functions shown in Figure 21
30 relate to the destination site functions for non-landfill destinations 1602, shown in Figure 16, in at least one embodiment. A determination 2102 is made as to whether the

destination is a transfer station. If the destination is not a transfer station, the program returns to the destination site functions for non-landfill destinations 1602, shown in Figure 16. If the destination is a transfer station, the program enters the destination transfer station site functions 2104. In at least one embodiment, the destination transfer station site functions 2104 can include a determination 2106 of whether the demurrage time is appropriate. If no demurrage time is appropriate, the destination returns to the destination transfer station site functions 2104. If there is demurrage time, the program in block 2108 can request input from the operator or automatically calculate demurrage time based on selection criteria in the portable unit. Further, the portable unit can include a preprogrammed query of the reason for demurrage. In general, the demurrage time can be accurately calculated by the start and stop time entered at the customer facility and the reason for the demurrage. This entry can facilitate correct billing, and a signature by the personnel at the transfer station, such as at a gatehouse, can be captured. The program can link back to the destination transfer station site functions 2104.

The destination transfer site functions 2104 can also include a determination 2110 of whether payment is required at the transfer station. If no payment is required, for example, when a credit account has been established or other arrangements made, then the operator can simply leave the waste at the transfer station, note in and out times, and make appropriate entries into the portable unit in block 2112, as may be requested or desirable. If payment is required, the payment can be made and recorded in the portable unit with in and out times and other information as may be appropriate in block 2116.

After leaving the waste, a determination 2114 can be made as to whether the daily routes are completed. If the daily routes are not completed, the system can link to a further determination 2200, shown in Figure 22, as to whether to return to the customer same site functions portions of the program in Figure 13. If daily routes are completed, the operator can deliver a box remaining on the vehicle, if any, to its final destination, capture the box identification number for box inventory management, and schedule any necessary box repairs in block 2602, referenced in Figure 26.

Figure 22 is a schematic diagram of a portion of the program related to destination site functions and customer site functions. As noted in Figure 21, if the daily routes are not completed in determination 2114, a determination 2200 can be made whether to

return to customer same site functions, referenced in Figure 13. If the answer is yes, the program returns in block 2204 to the customer same site functions 1302, shown in Figure 13. If the operator does not choose to return to the customer same site functions, a determination 2206 is made as to whether the daily routes are completed. If they are not completed, the program returns in block 2208 to the route sheet functions 1402, shown in Figure 14. If the daily routes are completed, the program is directed to a determination 2702 as to whether there is an empty box on the vehicle, referenced in Figure 27.

Referencing for the moment Figure 17, a determination 1706 is made as to whether the destination is a landfill. If the destination is a landfill, the flow line enters from the top on Figure 22 to the destination site functions landfill 2202. The destination site functions landfill 2202 includes a determination 2210 as to whether demurrage time is appropriate. If demurrage is inappropriate, the program returns to the destination site functions landfill 2202. If demurrage time is appropriate, the demurrage can be determined by operator selection on the portable unit in block 2212, or by automatic calculation through programming on the portable unit. Additionally, the portable unit can require input regarding the reason for the demurrage and a signature by an authorized person at the site. The destination site functions landfill 2202 can include features such as capturing the ticket number, manifest information, box identification, and other aspects in noted in block 2214 that can be uploaded to the database, referenced in Figure 1. The program can link to the determination 2200, described above, as to whether to return to the customer same site functions.

Figure 23 is a schematic diagram relating to a portion of the program for manifests. Referring briefly to Figure 24 described herein, one portion of the program requests a determination 2408 as to whether a manifest is required. Figure 23 further explains the logic flow path. If a manifest is not required, the flow line entering the top right of Figure 23 illustrates that any necessary billing or customer information can be input into the portable unit in block 2302. If a manifest is required, the flow line entering the right center portion of Figure 23 to block 2304 illustrates that the portable unit can be used to input any desired or necessary documentation as may be appropriate to complete a manifest. For example, a series of preprogrammed queries can be made to the operator or other personnel that step through a variety of "yes" and "no" questions, quantitative

and qualitative input, or other types of input. Further, the manifest can be provided from the customer via an electronic transfer, card swipe, IR input, scan, and other input methods. This feature may be especially advantageous when governmental agencies allow electronic manifests to be submitted. In such cases, the portable unit can upload
5 the information to the database, described in Figure 1, and an electronic manifest is submitted to the governmental agency for compliance with environmental regulations.

In at least one embodiment, regardless of whether an electronic manifest is required, a determination 2306 is made as to whether a customer sign off is required. Generally, the portable unit may default to request a customer sign off. In other cases,
10 the customer itself may dictate the procedure. Thus, the determination 2306 can be either customer-specific or defaulted to a particular requirement. If a customer sign off is required, as shown in block 2308, the portable unit can be used to capture the signature of an authorized person at the facility. If a customer sign off is not required, a further determination 2310 can be made as to whether there is a transaction receipt required.
15 Further details of the transaction receipt are described in reference to Figure 28.

Figure 26 is schematic diagram of a portion of the program relating to delivery of the box, file destination, and a possible pick up of an empty box. Referring briefly to Figure 21, a determination 2114 is made as to whether the daily routes are completed. If the answer is yes, the flow lines enter the top of Figure 26 to a block 2602. Block 2602
20 represents a portion of the system and method that allows the operator to deliver the box remaining on a vehicle to its final destination, capture the box identification for box inventory management, and schedule any necessary box repairs. Block 2602 is linked to block 2604, that represents the input of the box identification and verification of the box size. Such input can be accomplished manually by the operator, or a by a variety of other
25 input means, such as scanning, electronic transducers, and other methods described herein.

In at least one embodiment, after box identification, the program can proceed in block 2606 to the destination site functions for the box yard 1104, shown in Figure 11, where decisions such as the final destination for the day, pick up of new empty boxes,
30 and other decisions are made.

Figure 27 is a schematic diagram of a portion of the flow chart that relates to decisions after the daily routes are completed. Referring briefly to Figure 22, a determination 2206 is made as to whether the daily routes are completed. If the answer is yes, a flow line enters the top of Figure 27. A determination 2702 is made as to whether there is an empty box on the truck or other vehicle that the operator is using. If the answer is no, the program proceeds in block 2704 to the post trip functions 1004, shown in Figure 10. If the answer is yes, the operator can deliver the box remaining on the vehicle to its final location, as shown in block 2706, capture the box identification for box inventory management, and schedule any necessary box repairs. Block 2706 is linked to block 2708. Block 2708 represents input of the box identification number and verification of size, if desired. The program can proceed in block 2710 to the destination site functions for box yard 1104, shown in Figure 11.

Figure 28 is a schematic diagram of a portion of the program relating to transaction receipts and customer payments. Referring briefly to Figure 23, a determination 2310 is made as to whether a transaction receipt is required. The results of the determination are represented by the flow lines entering the top of Figure 28. If a transaction receipt is required, a further determination 2802 is made as to whether an electronic transaction receipt, such as via email or other electronic communications, is required. If no electronic transaction receipt is required, the operator can provide the customer in block 2808 a hard copy of the transaction receipt as an output from the portable unit. If one is required, in at least one embodiment, the portable unit can be used to either send the receipt or to schedule sending the receipt at a subsequent time in block 2804. For example, the scheduled receipt can be sent after upload of the information to the base unit. Some customers may also request a hard copy of the transaction receipt. Therefore, a determination 2806 can also be made as to whether a hard copy receipt is required. If a hard copy is also needed, the operator and/or portable unit can provide a hard copy of the transaction receipt as an output from the portable unit. If the answer is no, the system can also made a determination 2810 as to whether a credit card payment is required, discussed below.

Returning to the determination 2310 in Figure 23, if no transaction receipt is required, or if a transaction receipt was provided by the determination 2806, a further

determination 2810 is made as to whether a credit card payment is required. If no credit card payment is required, the system can return through the flow line represented to the left of Figures 18, 23, 28 into Figure 13. If a credit card payment is required, the operator can complete the credit card transaction in block 2812 and provide the customer with the receipt. The program can return to the customer site functions 1302, referenced in Figure 13, for further instructions as needed or desired.

While the foregoing is directed to various embodiments of the present invention, other and further embodiments may be devised without departing from the basic scope thereof. Other embodiments within the scope of the claims herein will be apparent to one skilled in the art from consideration of the specification and practice of the invention as disclosed herein. For example, various other flow paths of various orders and options can be included to provide the functionality described herein and claimed in the claims. It is intended that the specification, together with the example, be considered exemplary only, with the scope and spirit of the invention being indicated by the claims which follow.

The various methods and embodiments of the invention can be included in combination with each other to produce variations of the disclosed methods and embodiments, as would be understood by those with ordinary skill in the art, given the understanding provided herein. Also, various aspects of the embodiments could be used in conjunction with each other to accomplish the understood goals of the invention. Also, the directions such as "top," "bottom," "left," "right," "upper," "lower," and other directions and orientations are described herein for clarity in reference to the Figures and are not to be limiting of the actual device or system or use of the device or system. Unless the context requires otherwise, the word "comprise" or variations such as "comprises" or "comprising", should be understood to imply the inclusion of at least the stated element or step or group of elements or steps or equivalents thereof, and not the exclusion of a greater numerical quantity or any other element or step or group of elements or steps or equivalents thereof. The device or system may be used in a number of directions and orientations. Further, the order of steps can occur in a variety of sequences unless otherwise specifically limited. The various steps described herein can be combined with other steps, interlineated with the stated steps, and/or split into multiple

steps. Additionally, the headings herein are for the convenience of the reader and are not intended to limit the scope of the invention.

Further, any references mentioned in the application for this patent as well as all references listed in the information disclosure originally filed with the application are
5 hereby incorporated by reference in their entirety to the extent such may be deemed essential to support the enabling of the invention. However, to the extent statements might be considered inconsistent with the patenting of the invention, such statements are expressly not meant to be considered as made by the Applicant.

CLAIMS

1. A waste management system, comprising:
 - a. a waste management electronic base system having a memory, processor,
5 an input element, and an output element, the base system adapted to process waste management data for tracking a location of a waste storage unit, billing a customer associated with a waste removal, and paying personnel for services associated with the waste removal; and
 - b. an electronic portable unit having a memory, processor, an input element,
10 and an output element, the portable unit adapted to allow an operator during a waste removal to use the portable unit and to allow onsite input at a customer facility from preprogrammed queries regarding the waste removal and further being adapted to generate an output of the data to the base system for processing.
- 15 2. The system of claim 1, further comprising a waste removal vehicle and a waste storage unit selectively coupled with the waste removal vehicle.
3. The system of claim 1, wherein the waste comprises industrial waste and the system is adapted to comply with a manifest associated with the industrial waste.
- 20 4. The system of claim 1, wherein the base system generates a manifest based on information from a generator of waste obtained from the portable unit.
5. The system of claim 1, wherein the onsite input allows operator input, automatic
25 input, or a combination thereof.
6. The system of claim 1, wherein the onsite input comprises a scanner, keyboard, touch screen, wireless interface, voice recognition interpreter, preprogrammed cards, or a combination thereof.

30

7. The system of claim 1, wherein the portable unit output comprises a wireless interface with the base system.
8. The system of claim 1, wherein the system further comprises multiple portable units for multiple operators during their respective routes for multiple waste removals.
9. The system of claim 1, wherein the base system is adapted to provide download information to the portable unit, the information containing instructions to the operator for a route of the operator.
10. The system of claim 1, wherein the portable unit is adapted to require predetermined operator input for a first operation to release the operator to perform a next operation.
11. The system of claim 1, wherein the portable unit is adapted to output an invoice for a customer at the customer site relative to the waste removal.
12. A method of managing waste removal, comprising:
- a. using a waste management electronic base system having a memory, processor, an input element, and an output element, to process waste management data, comprising:
 - i. tracking a location of a waste storage unit;
 - ii. billing a customer associated with a waste removal; and
 - iii. paying personnel for services associated with the waste removal;
 - and
 - b. using an electronic portable unit having a memory, processor, an input element, and an output element, to gather onsite data for the base system, comprising:
 - i. allowing an operator to input onsite data at a customer facility into the portable unit from preprogrammed queries regarding the waste removal; and
 - ii. generating an output of the data to the base system for processing.

13. The method of claim 12, further comprising downloading information from the base system to the portable unit, the information containing instructions to the operator for a route of the operator.
- 5 14. The method of claim 12, further comprising requiring predetermined operator input for a first operation to release the operator to perform a next operation.
15. The method of claim 12, further comprising scanning input information into the portable unit regarding a waste storage unit.
- 10 16. The method of claim 12, further comprising selectively coupling a waste storage unit with the waste removal vehicle.
17. The method of claim 12, wherein the waste comprises an industrial waste and
15 further comprising generating a manifest associated with the industrial waste.
18. The method of claim 12, further comprising accepting an electronic manifest into the portable unit.
- 20 19. The method of claim 12, further comprising generating an invoice from the portable unit for a customer at the customer site relative to the waste removal.
20. The method of claim 12, further comprising providing the onsite input with operator input, automatic input, or a combination thereof.
- 25 21. The method of claim 12, further comprising providing the onsite input by a scanner, keyboard, touch screen, wireless interface, voice recognition interpreter, preprogrammed cards, or a combination thereof.
- 30 22. The method of claim 12, further comprising sharing information between the portable unit and the base system through a wireless interface.

23. The method of claim 12, further comprising requiring a predetermined operator input for a first operation before releasing the operator to perform a next operation.

ABSTRACT OF THE DISCLOSURE

The present invention provides a system and method for electronically automating the solid waste hauling industry's existing paper system for tracking driver services. In at least one embodiment, the system directs the driver through his daily activities, allowing changes and corrections to customer service data along a route. This information is uploaded and converted to payroll data, customer service information, and invoicing for customers, among other aspects, periodically throughout the route or upon return to a home base after the route. The information that is collected on site and in real time into a unit available to the driver during the route can require specific and traceable entries that improve the accuracy and completeness of the data useful to the waste management system. The automation provides the information collected by a driver independently of additional clerks that heretofore have been used to input this information into a waste management system.

Fig. 1A

2

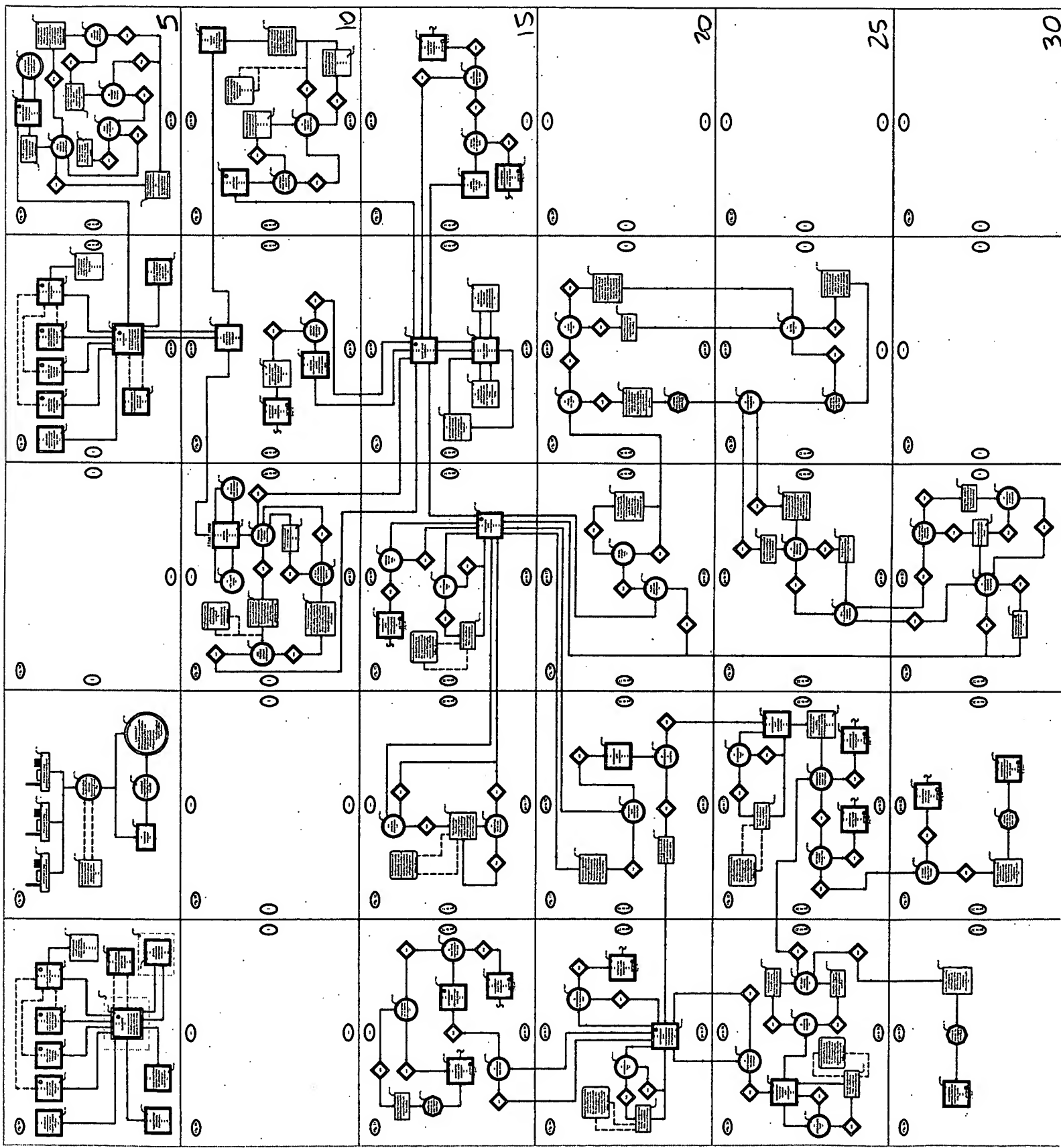


Fig. 01

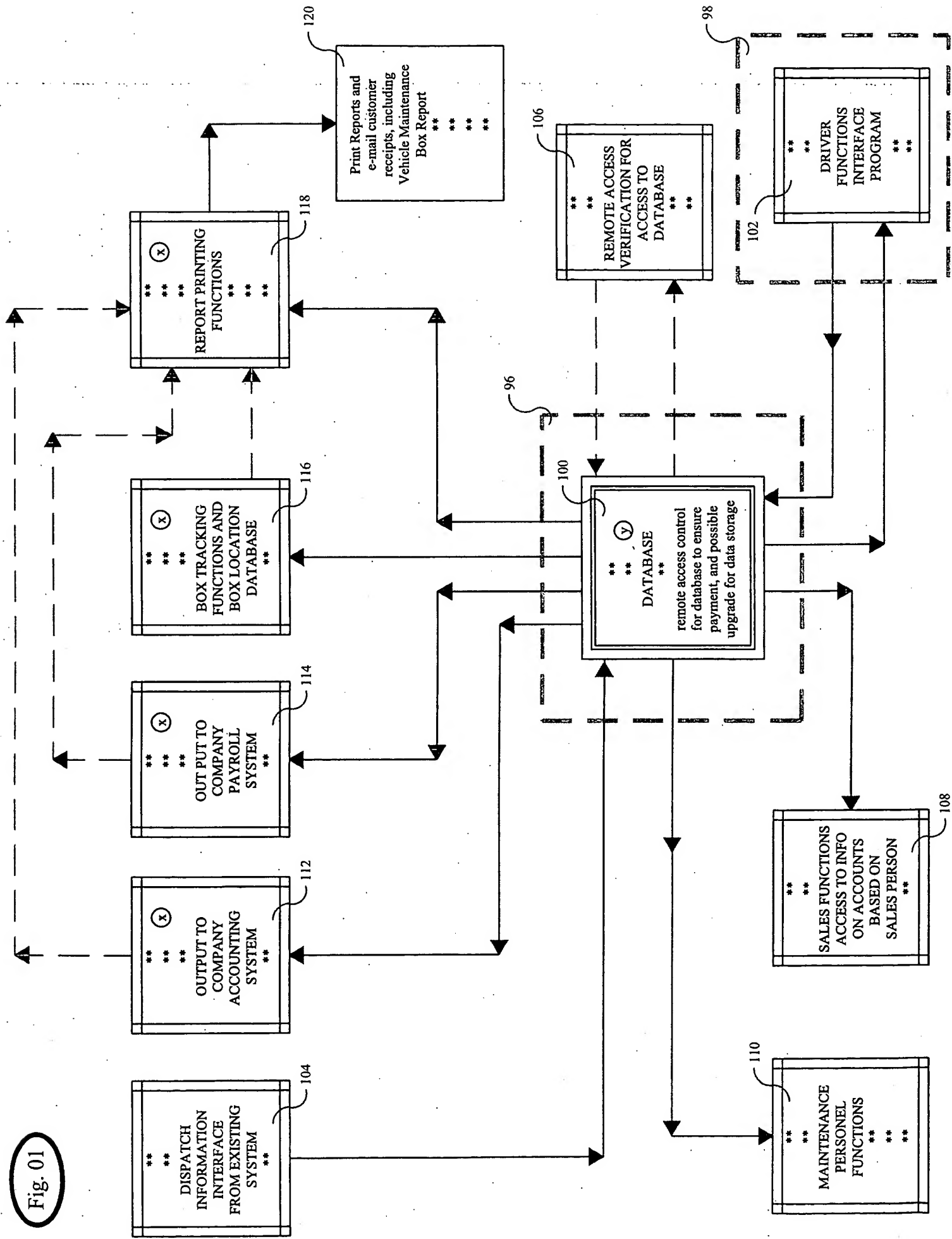


Fig. 02

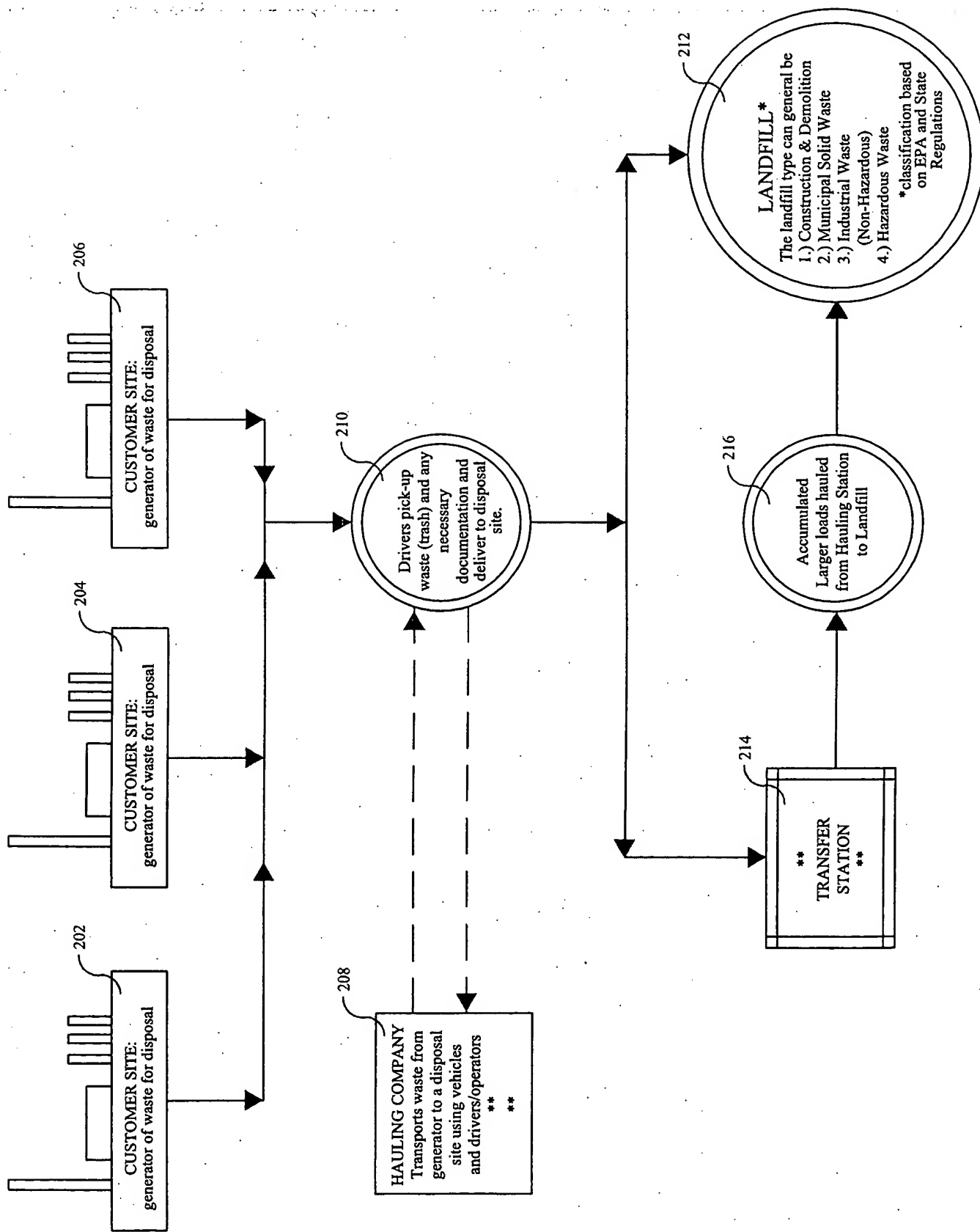


Fig. 04



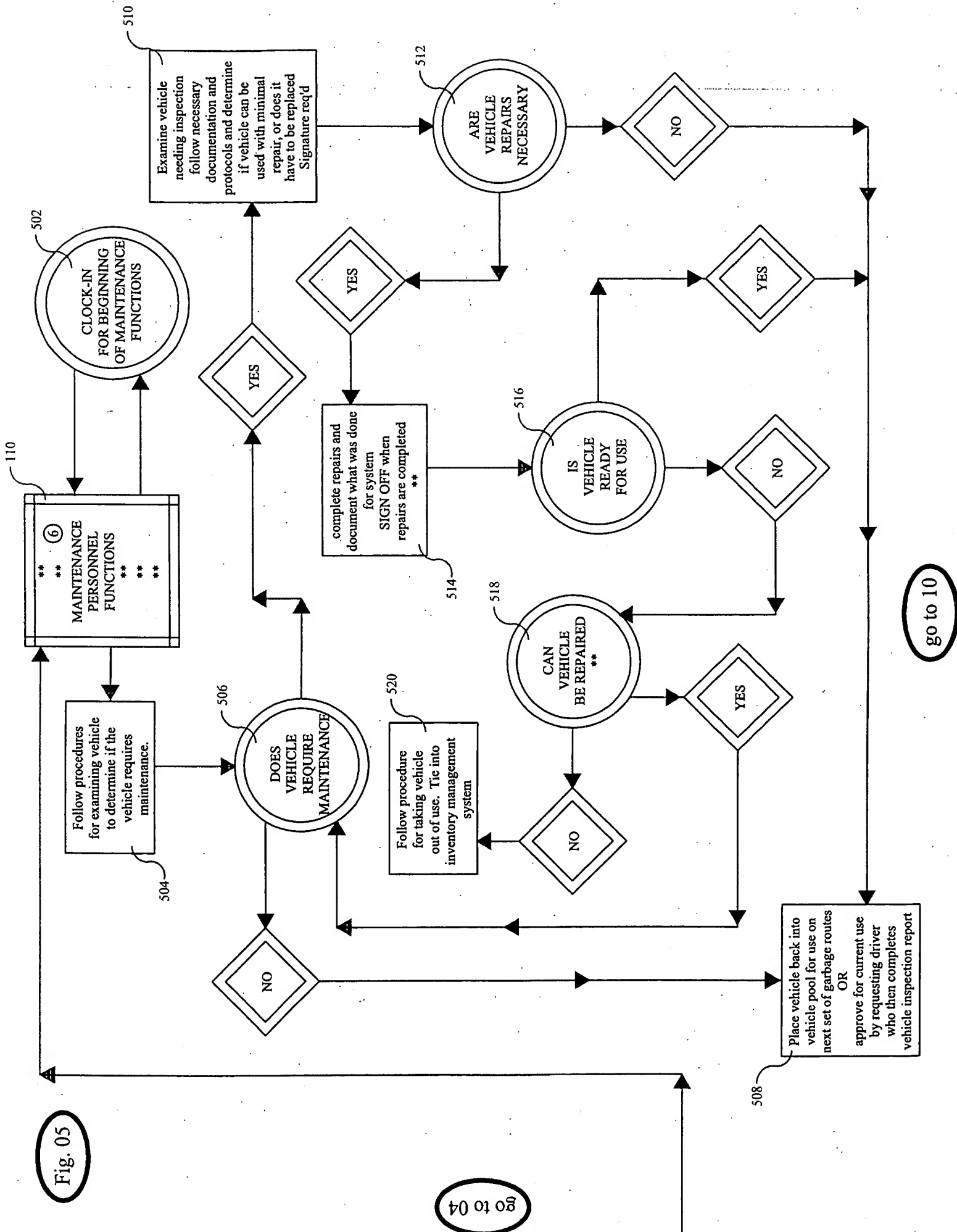
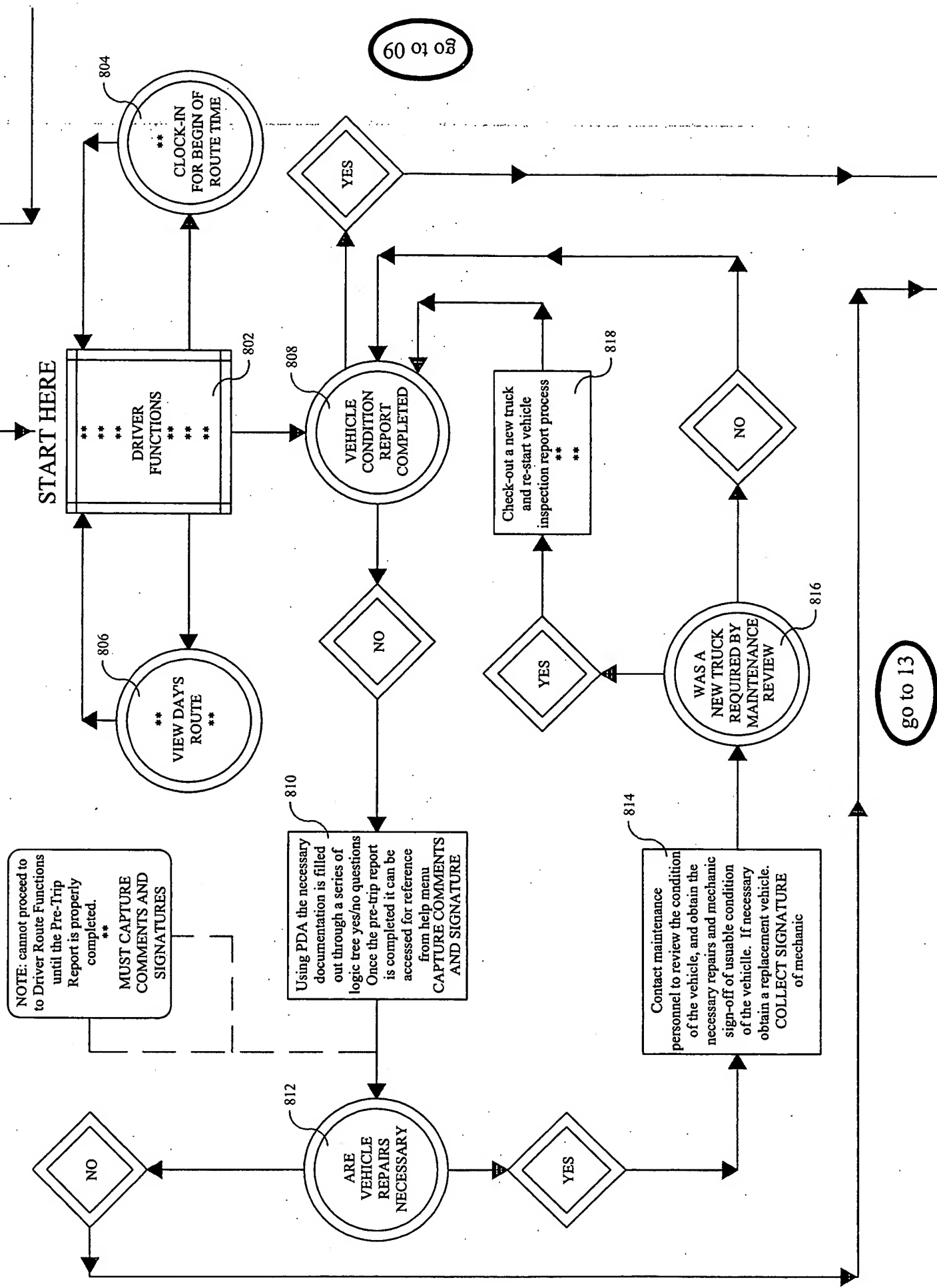
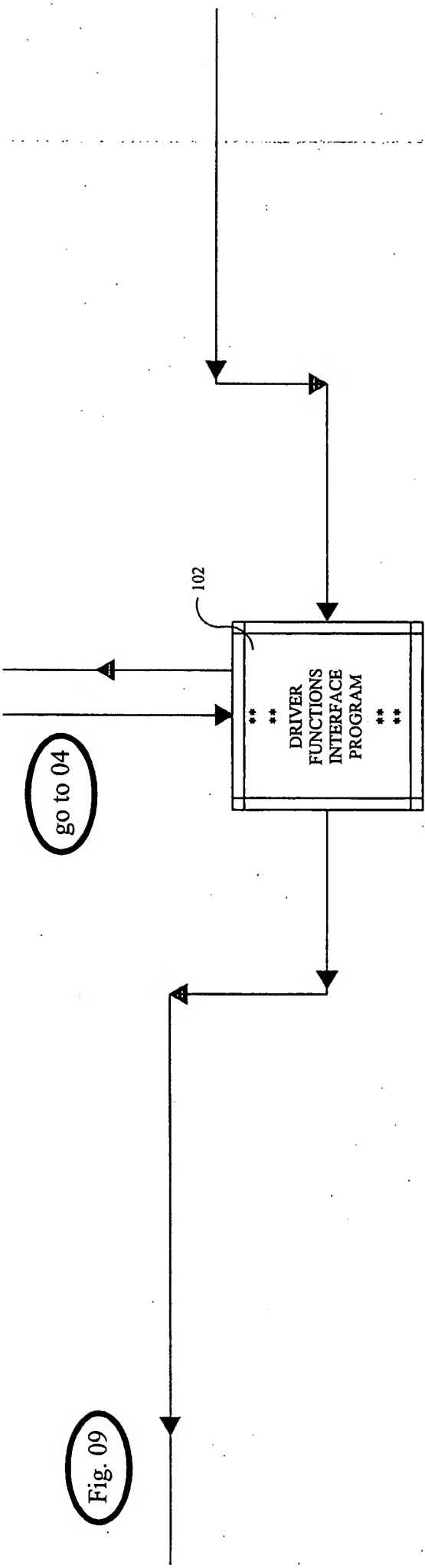


Fig. 08

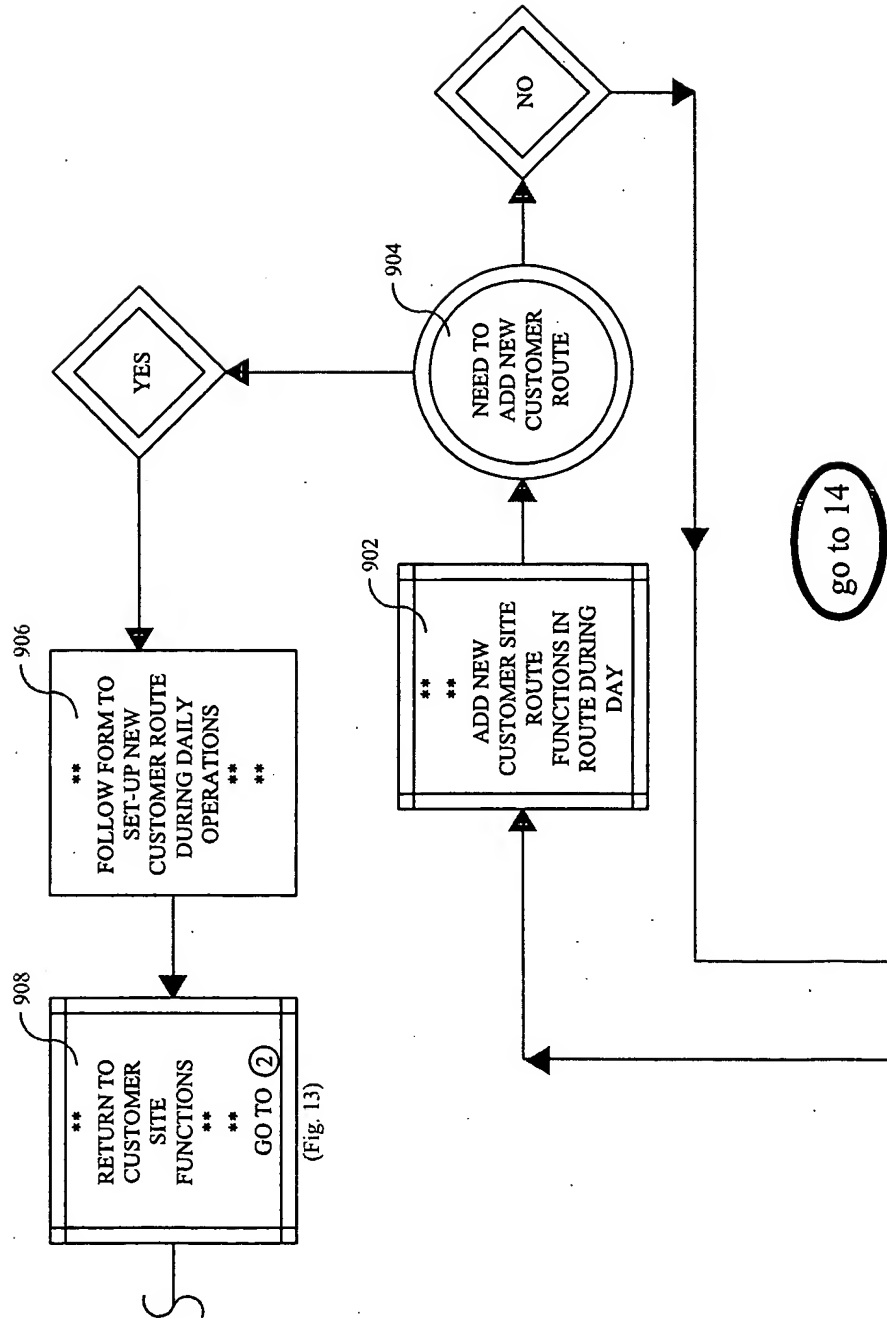


60 of 08

go to 10



go to 08



go to 05

Fig. 10

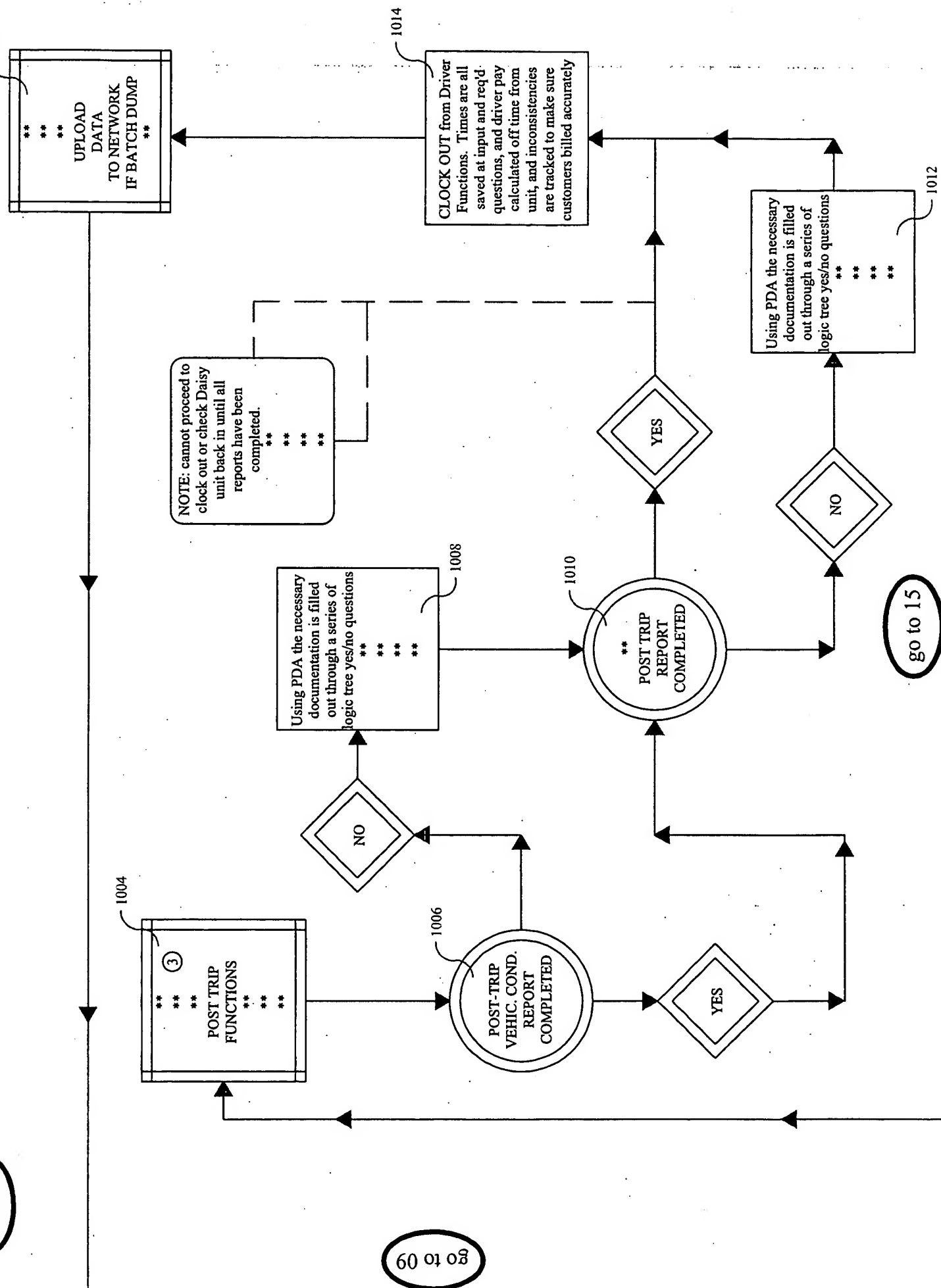
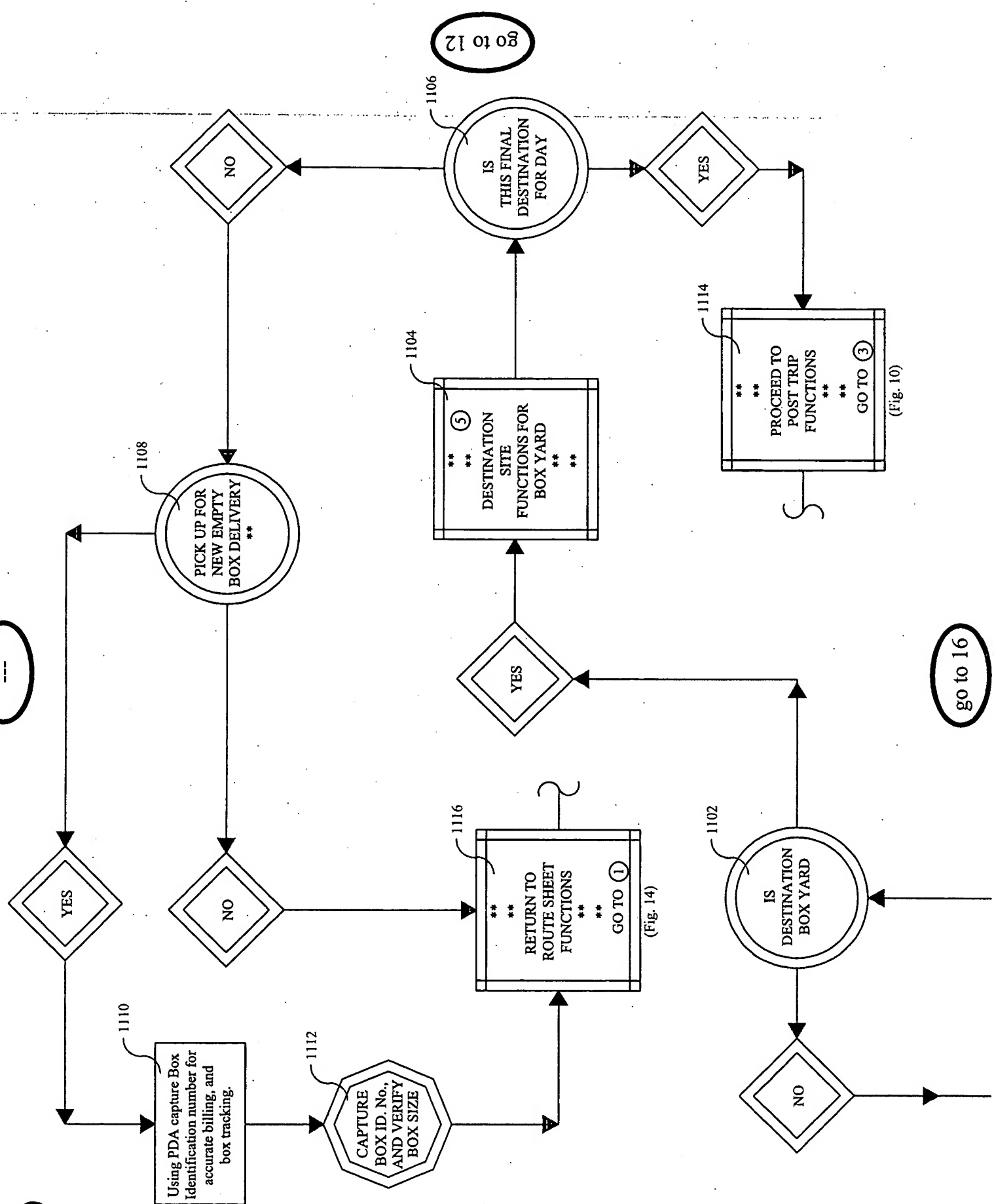
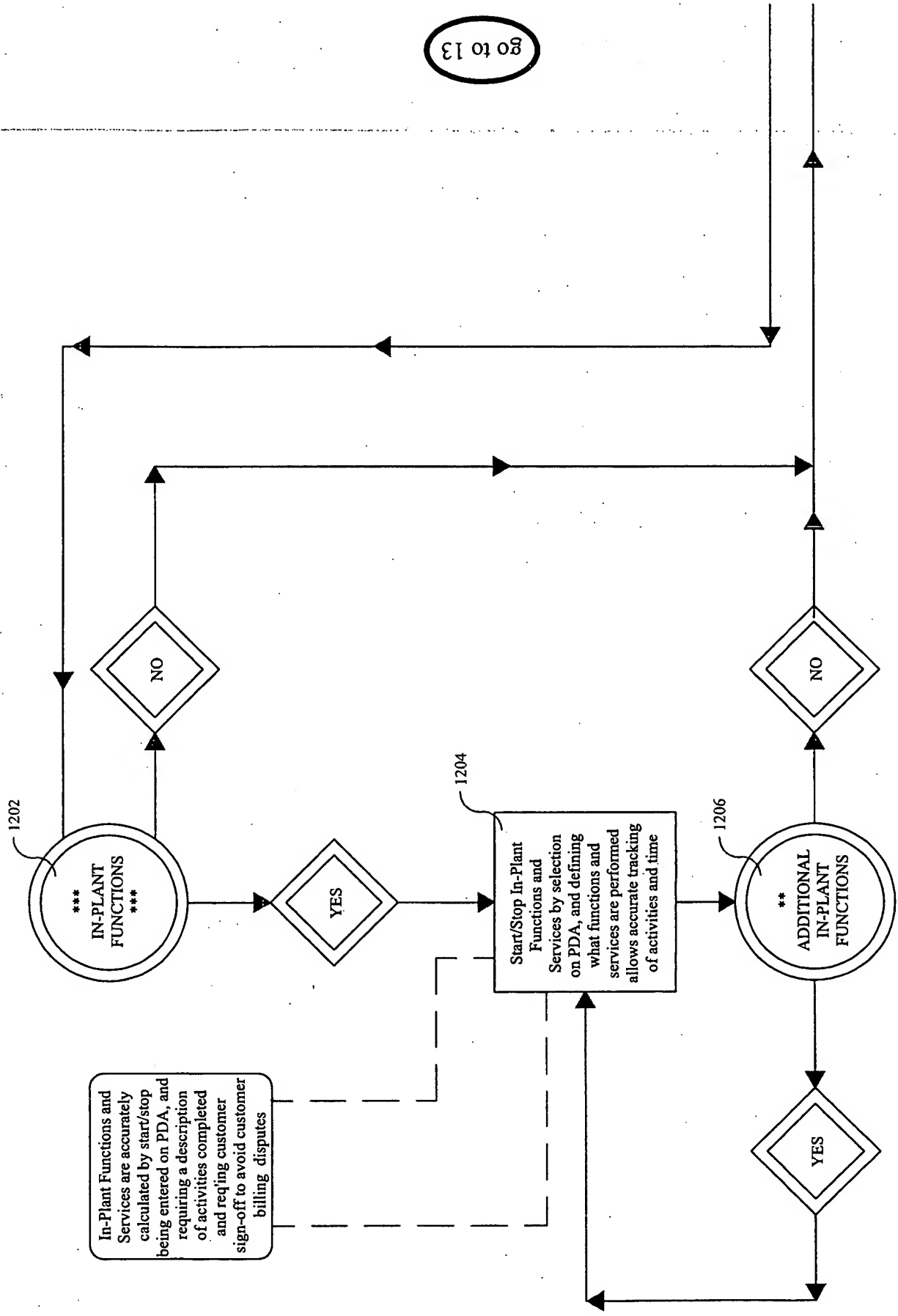


Fig. 11.



go to 16

Fig. 12



go to 11

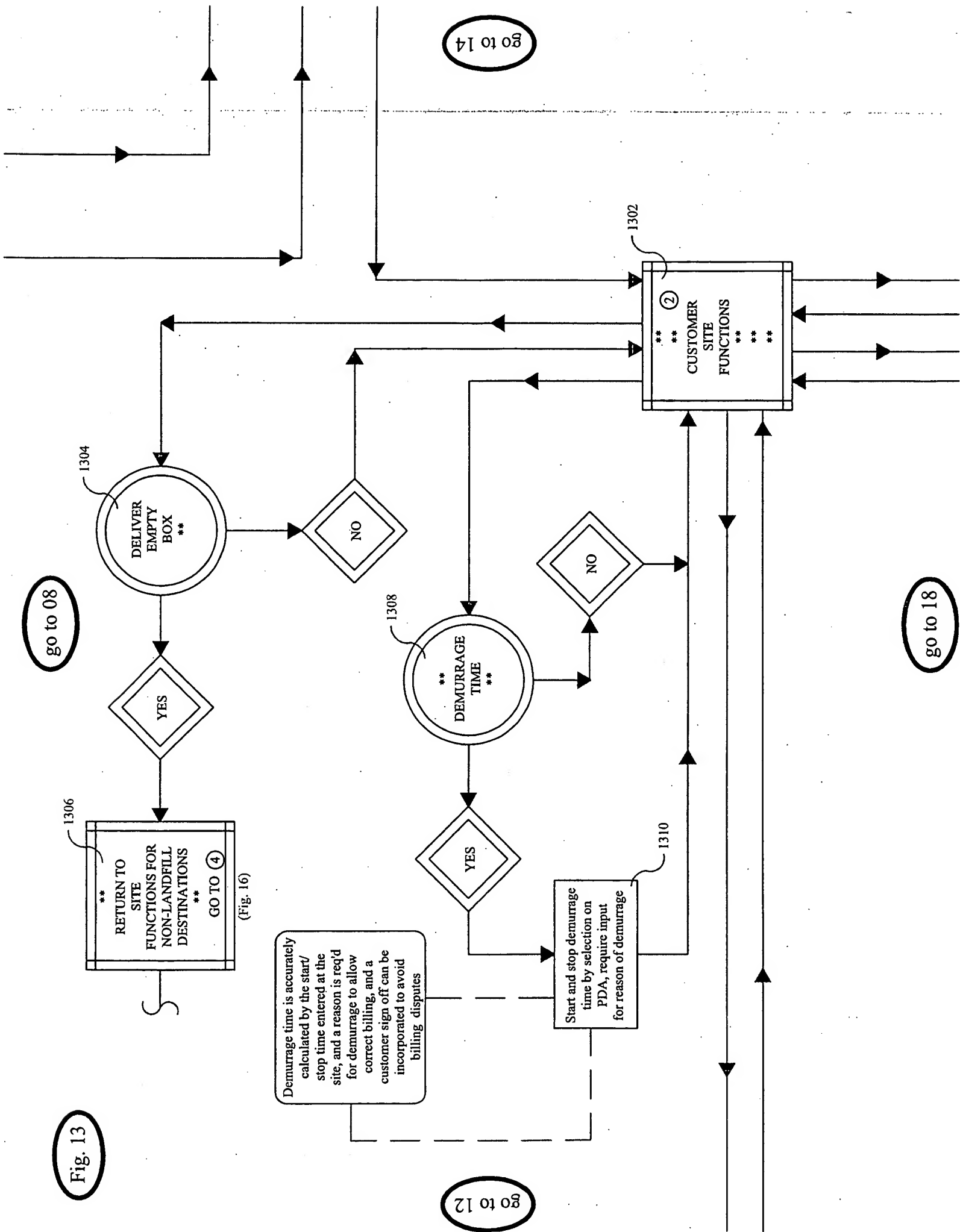
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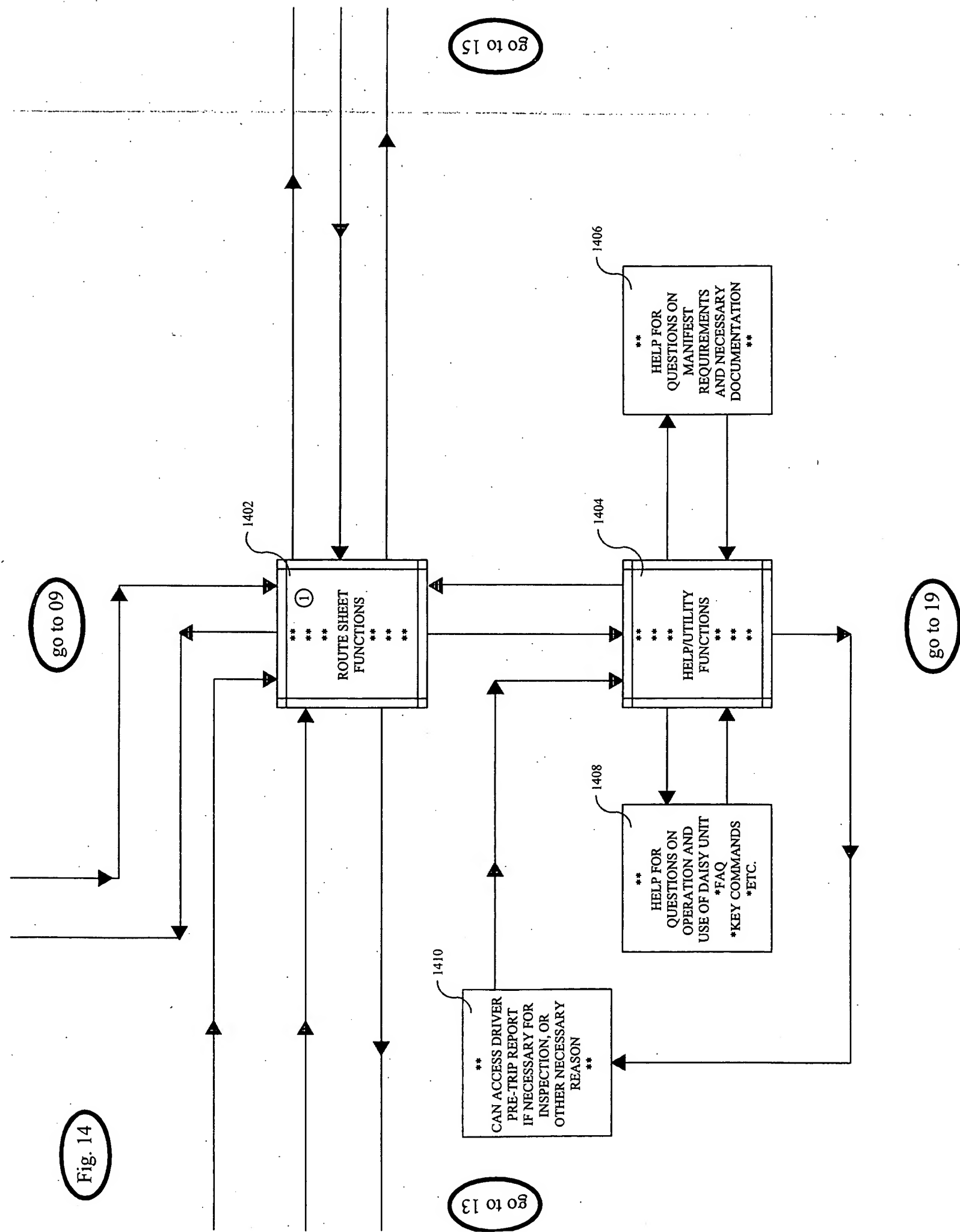
go to 13

Fig. 13

go to 08

go to 18





go to 10

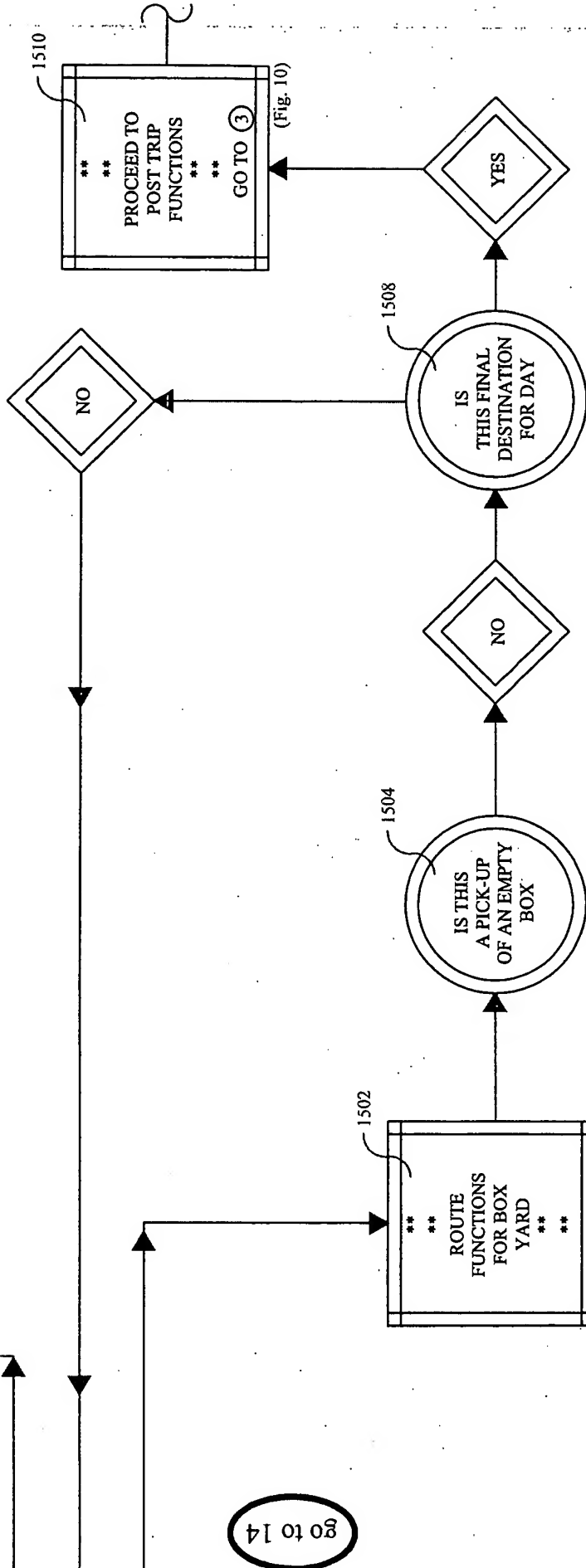
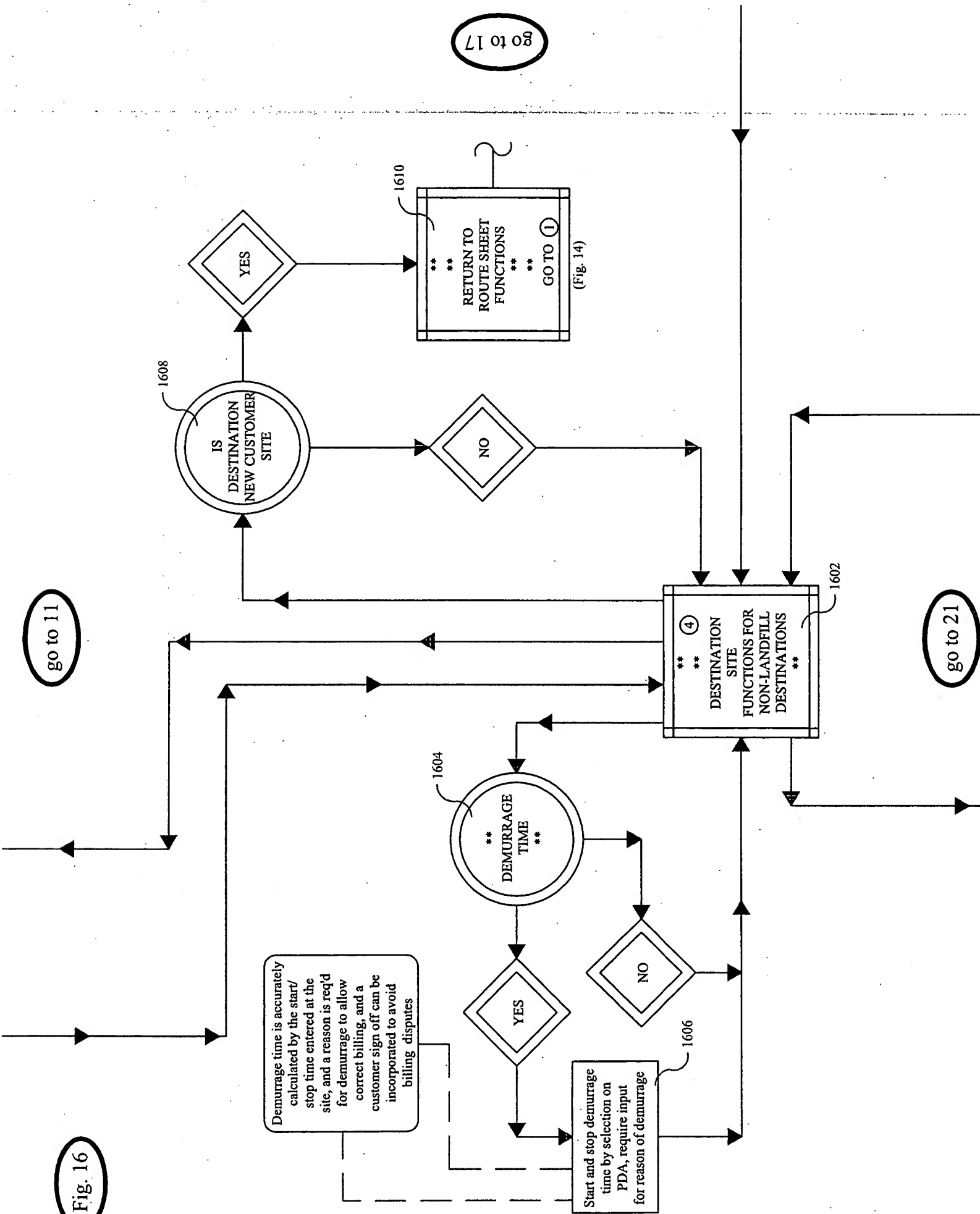
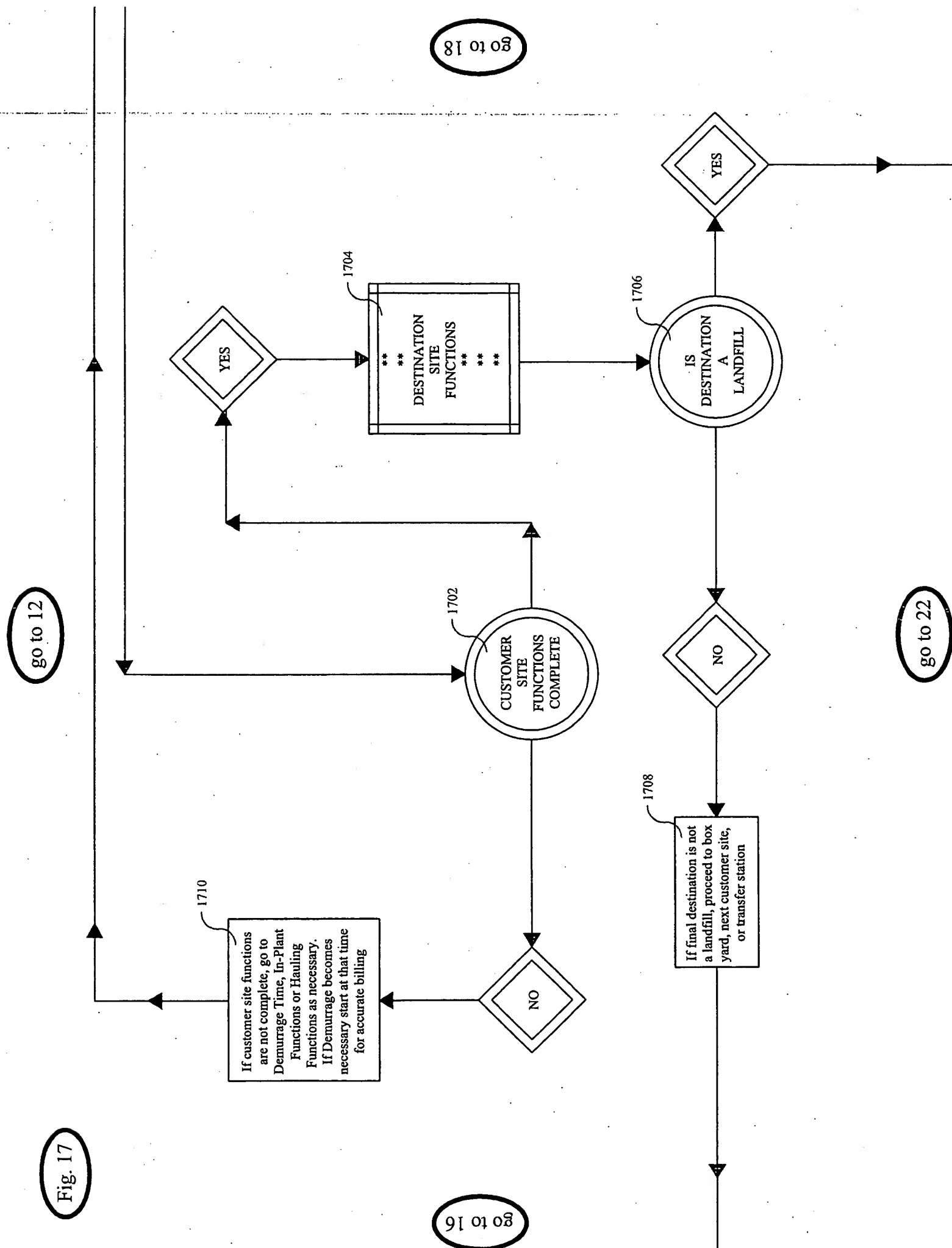


Fig. 15

go to 14

Fig. 16





go to 19

1806

Is it company policy
to swap lease boxes for
company boxes if possible
to maximize company
profit, if so follow
protocol for swap,
and capture box Id. no.
FLAG BOX IN
SYSTEM FOR SWAP

YES

1804

IS BOX
A LEASE
BOX
**

NO

1802

PLANT
HAULING
FUNCTIONS
**

YES

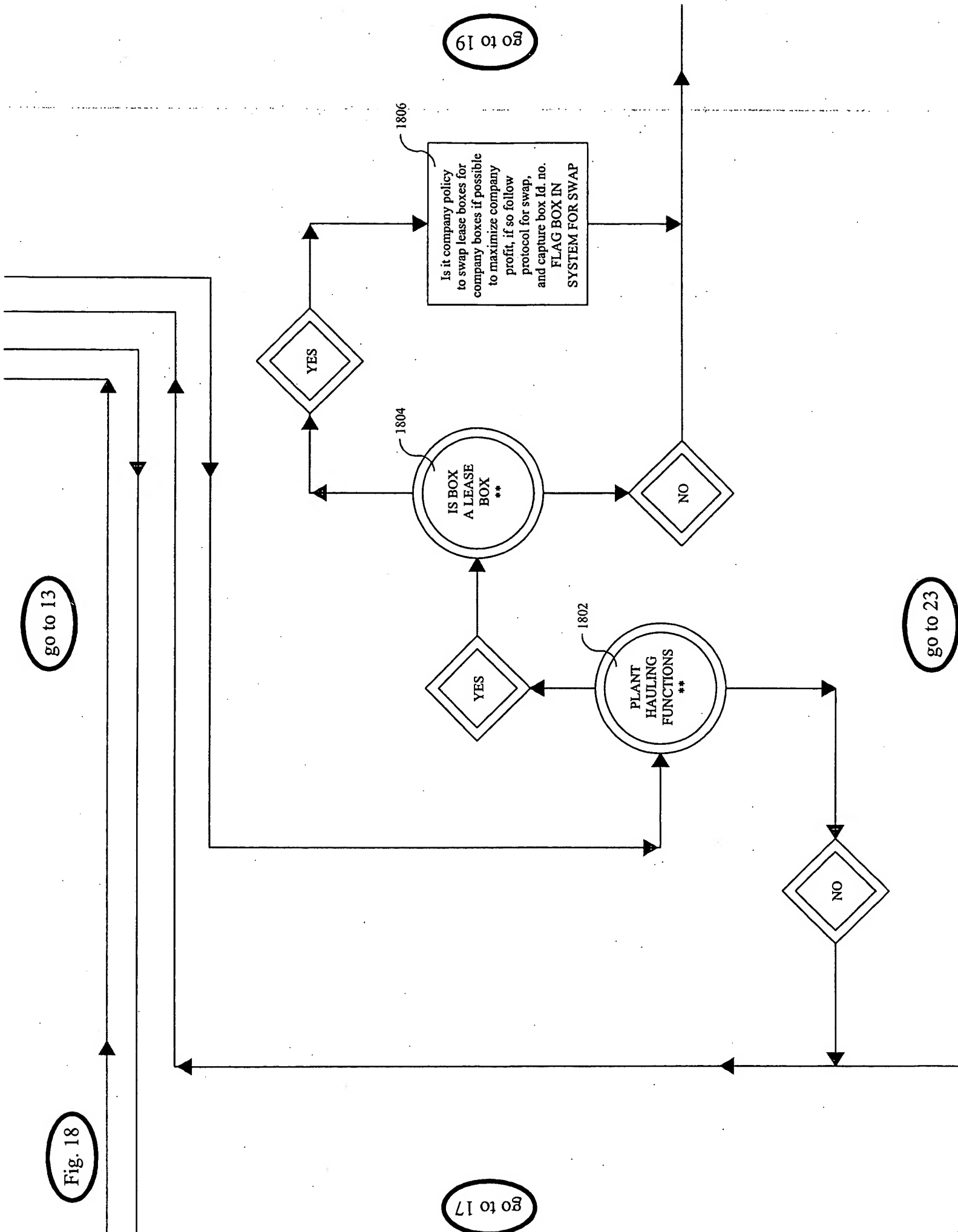
NO

go to 23

go to 17

Fig. 18

go to 13



go to 14

go to 24

go to 18

Fig. 19

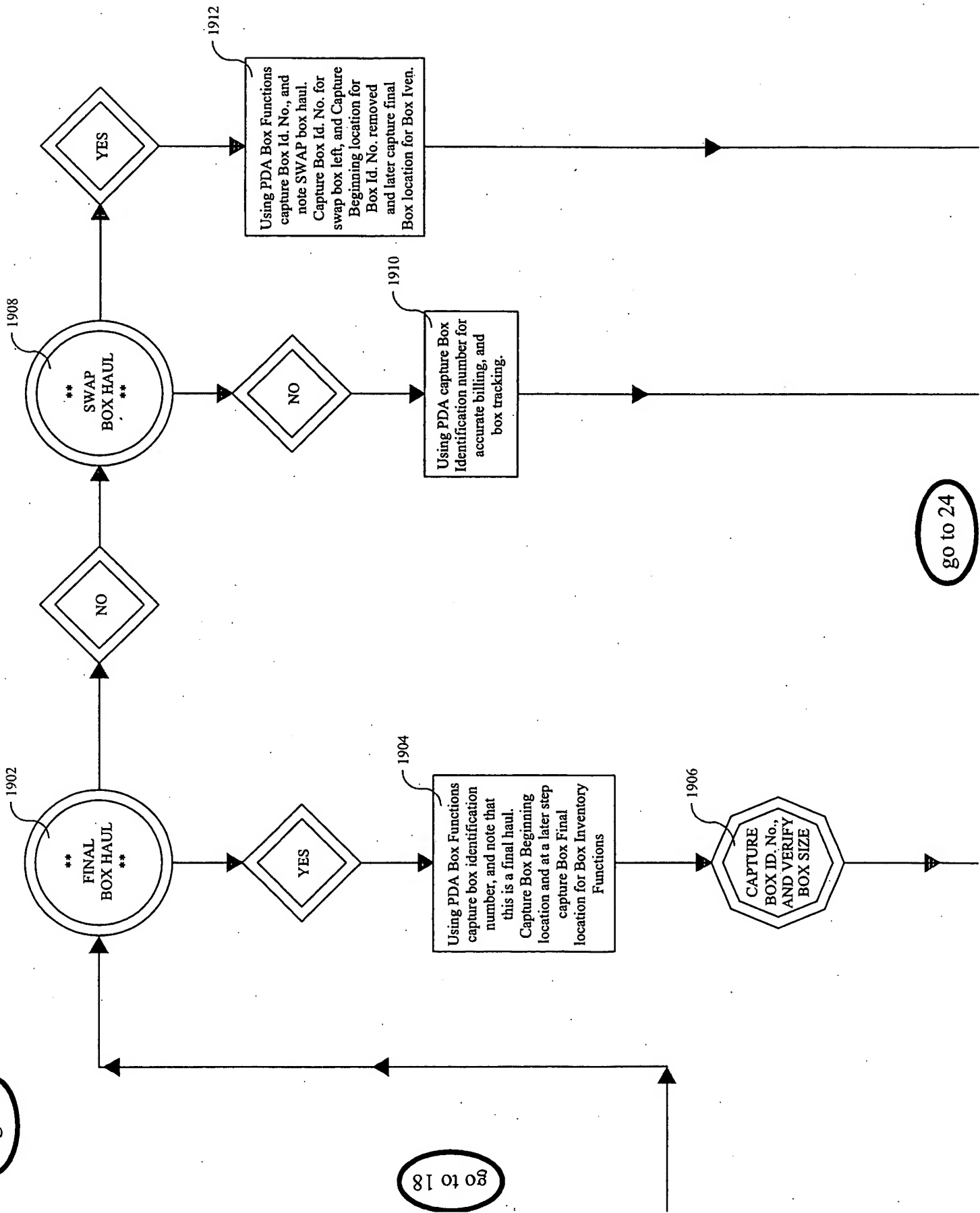
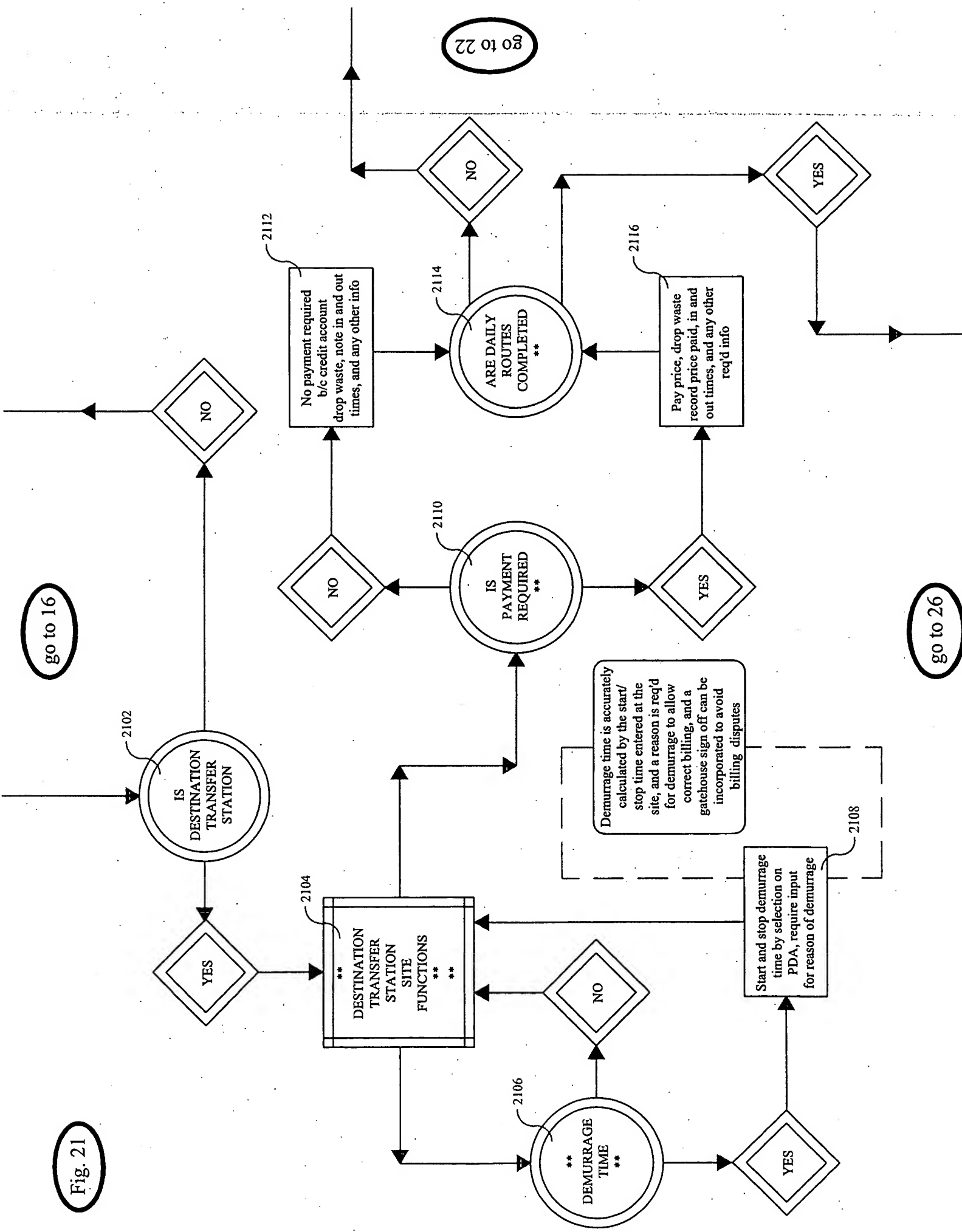


Fig. 21



go to 22

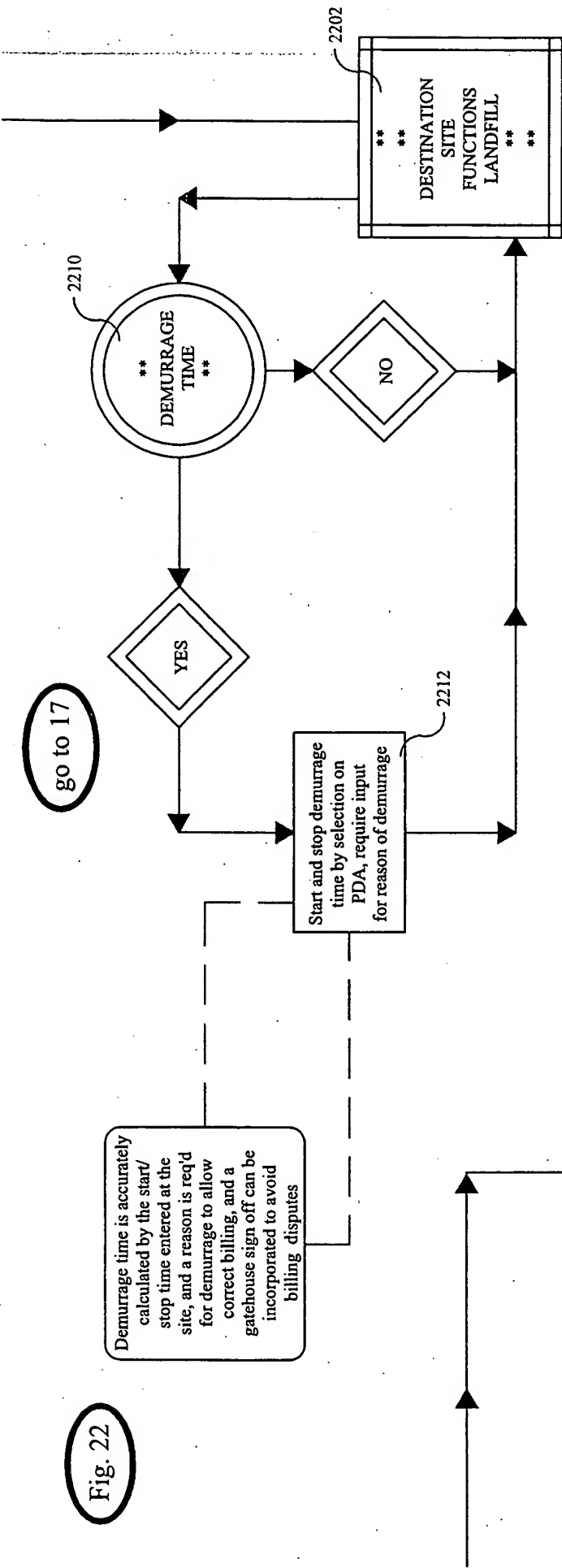
go to 16

go to 26

Fig. 22

Demurrage time is accurately calculated by the start/stop time entered at the site, and a reason is req'd for demurrage to allow for correct billing, and a gatehouse sign off can be incorporated to avoid billing disputes

go to 17



go to 21

go to 27

go to 23

go to 23

Fig. 14

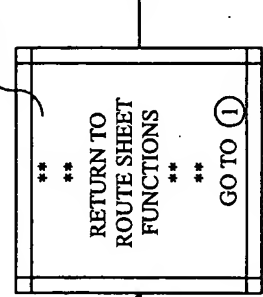
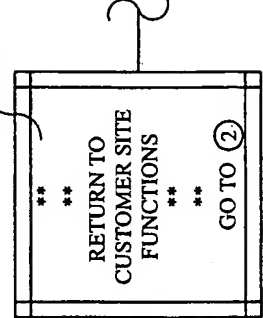
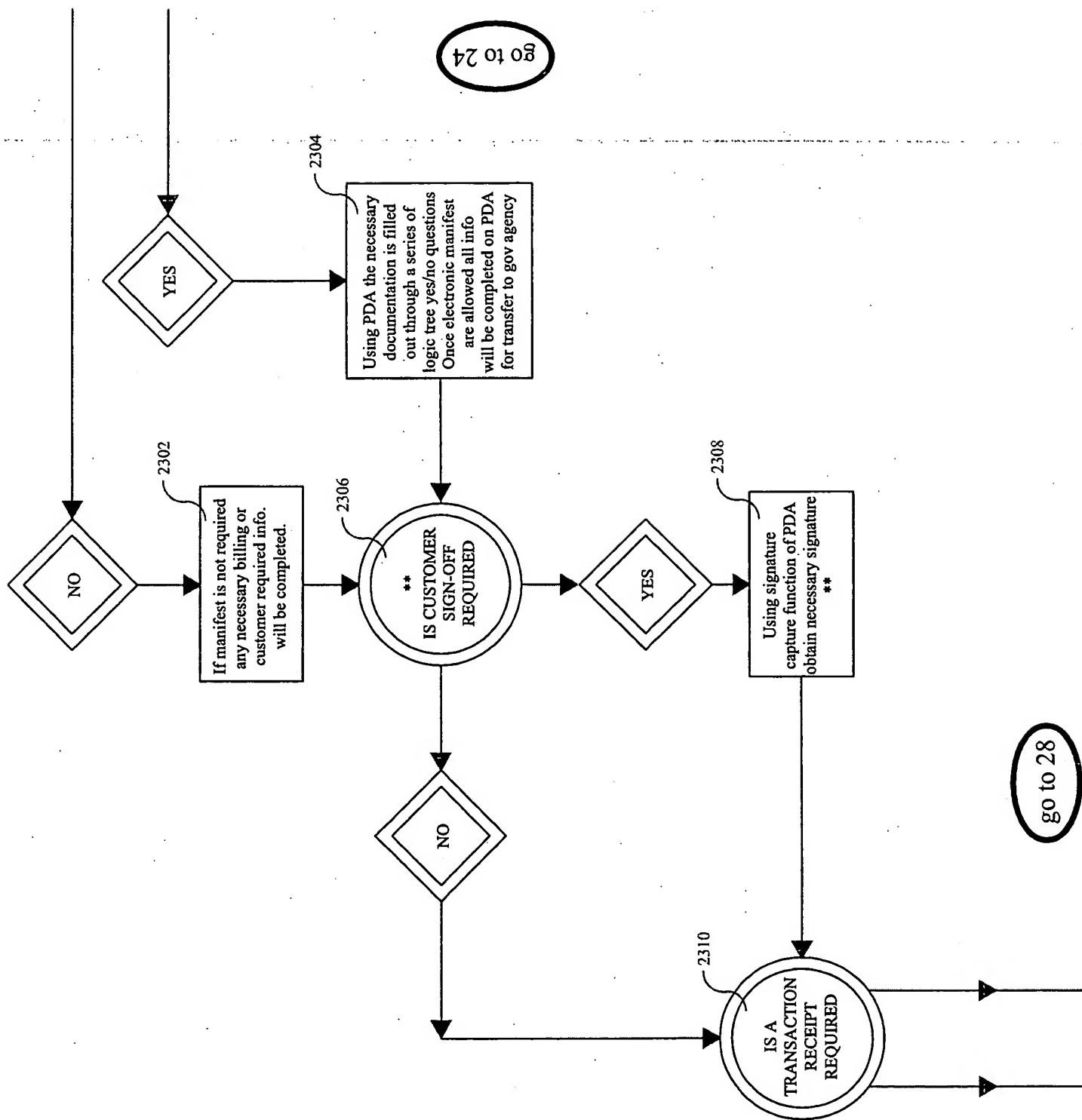
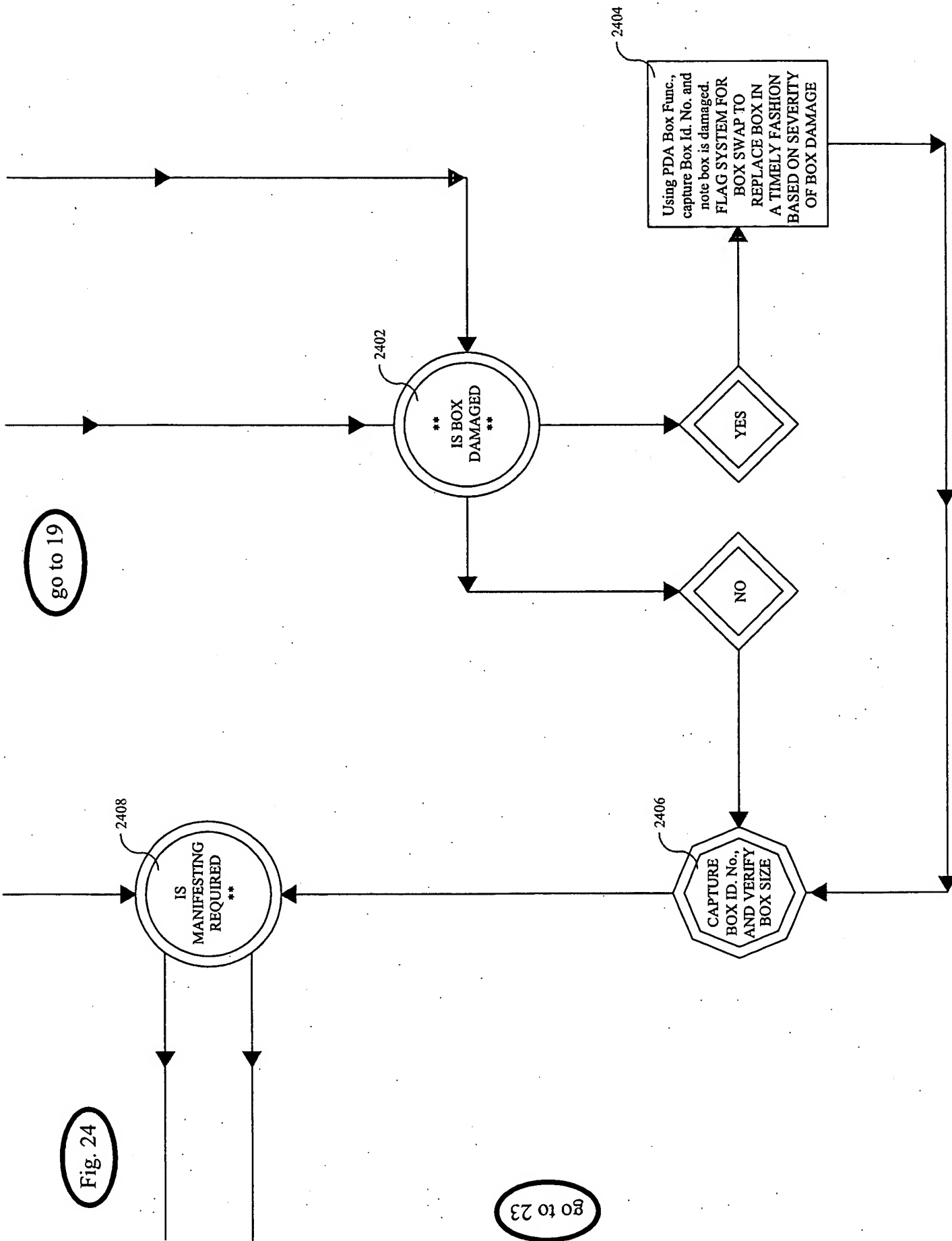


Fig. 13





...



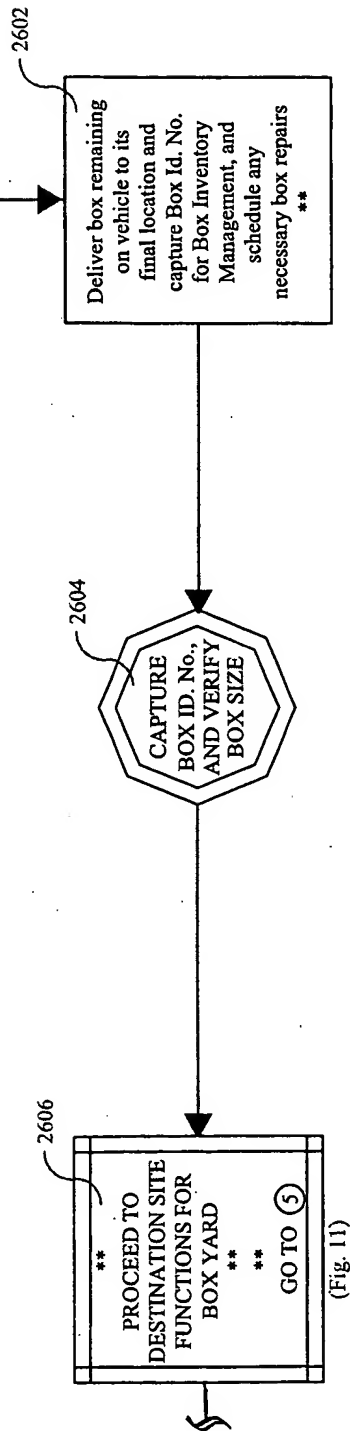
...

go to 23

Fig. 24

Fig. 26

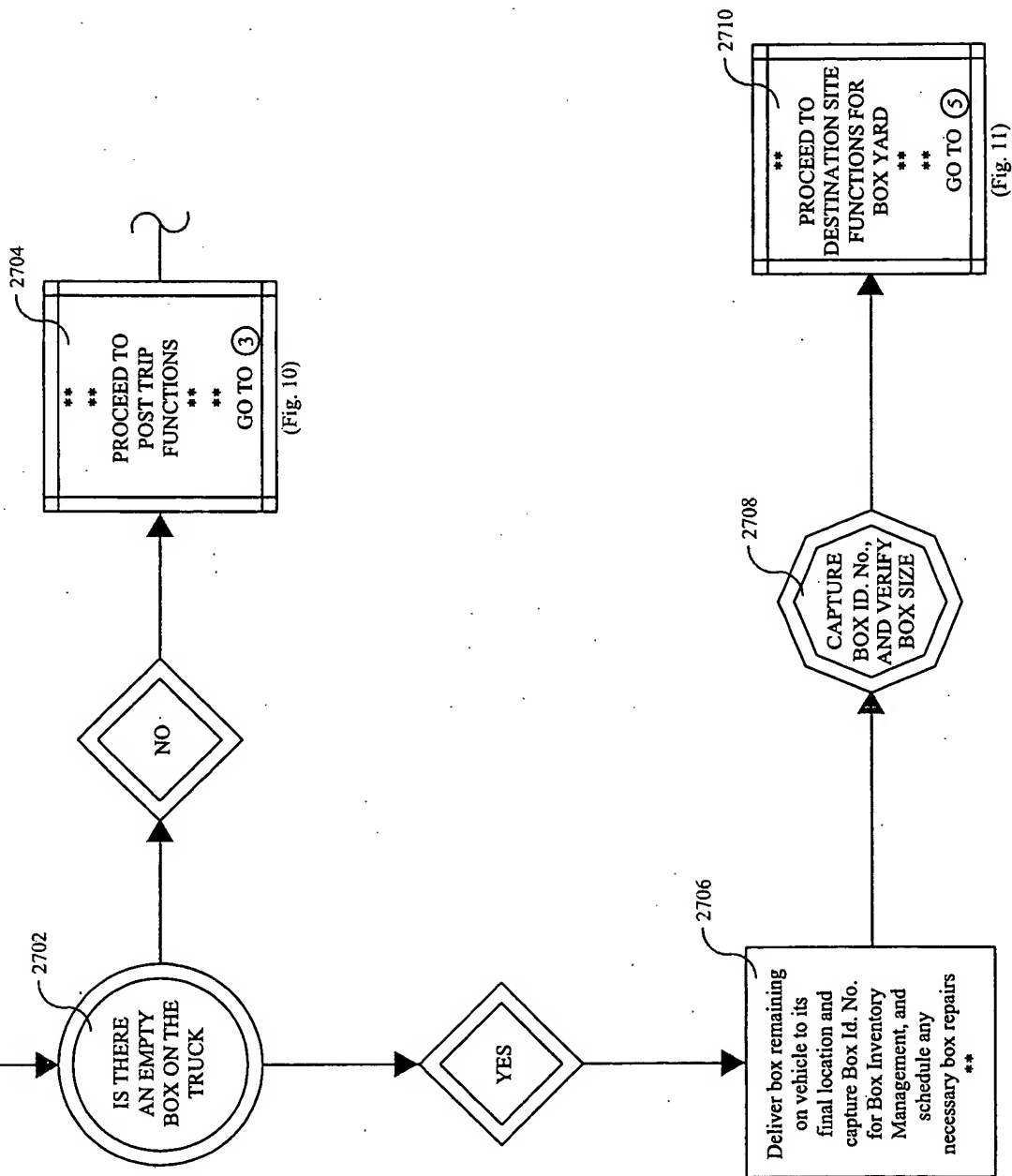
go to 21



go to 27

go to 28

Fig. 27



go to 26

...

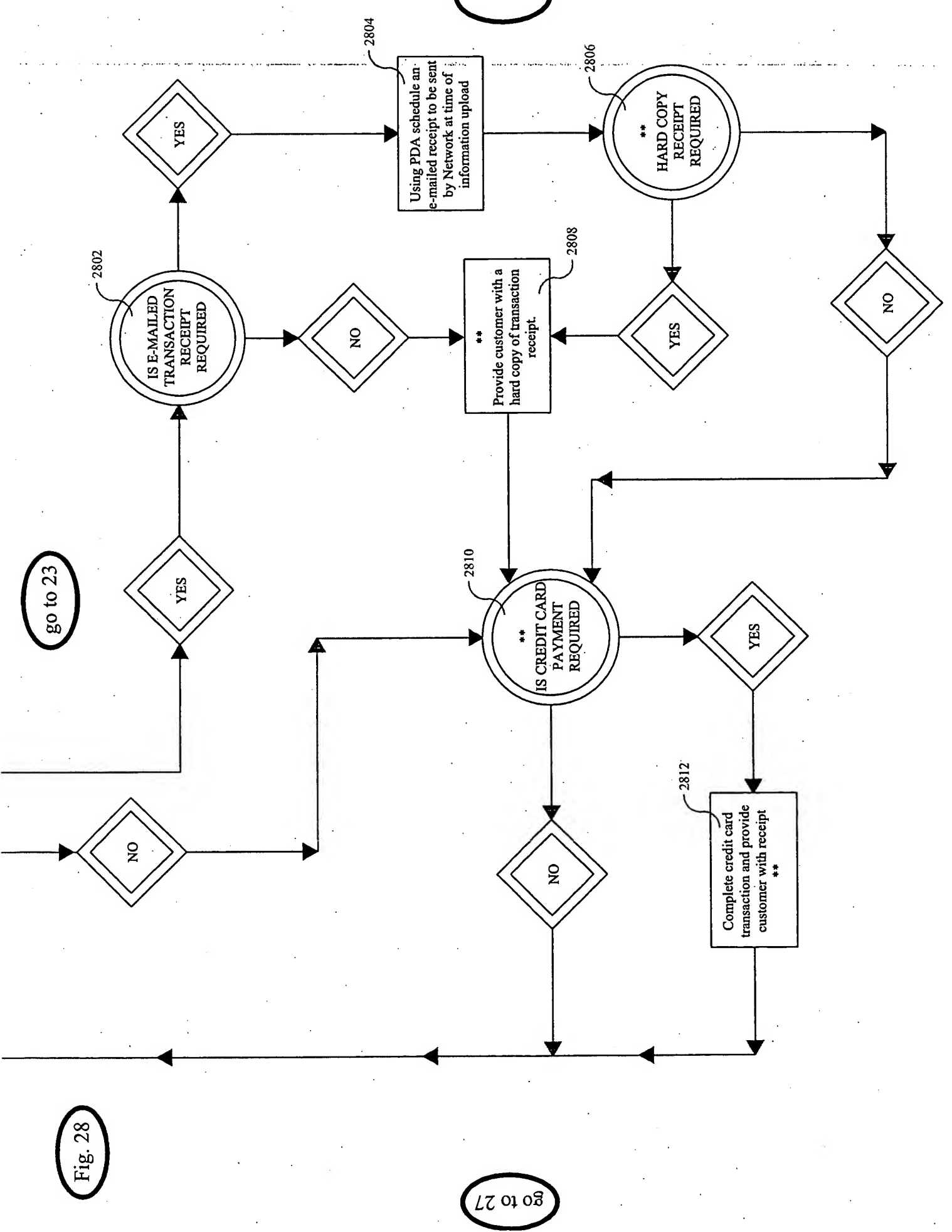


Fig. 28

go to 27

go to 23

DECLARATIONSOLE/JOINT INVENTOR
ORIGINAL/SUBSTITUTE/CIP

As a below named inventor, I hereby declare that: my residence, post office address, and citizenship are as stated below next to my name. I believe I am the original, first, and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

ELECTRONIC WASTE MANAGEMENT SYSTEM

as described in the specification [☒] attached or [☐] of patent Application Serial No. _____, filed _____

and amended on _____.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above; that I do not know and do not believe the same was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application; that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representative or assigns more than twelve months prior to this application; and that I acknowledge the duty to disclose information of which I am aware which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations § 1.56(a). Such information is material when it is not cumulative to information already of record or being made of record in the application, and

(1) it establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or

(2) it refutes, or is inconsistent with, a position the applicant has taken or may take in:

(i) opposing an argument of unpatentability relied on by the Office, or

(ii) asserting an argument of patentability.

I hereby claim foreign priority benefits under Title 35, United States Code § 119 of any foreign application(s) for patent or inventor's certificates listed below and have also identified below any foreign application(s) having a filing date before that of the application(s) on which priority is claimed:

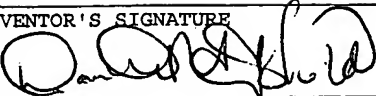
COUNTRY	APPLICATION NUMBER	DATE OF FILING	PRIORITY CLAIMED UNDER 35 USC 119
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO

I hereby claim the benefit under Title 35 United States Code § 120 of any United States application(s) listed below and, insofar as any subject matter of any claim of this application is not disclosed in the prior United States Application, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations § 1.56(a) which occurred between the filing date of the prior application and the national PCT international filing date of this application:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Please direct all written communications to the address listed below: All telephone calls should be directed to D. Brit Nelson at (713) 226-1361.

D. Brit Nelson
Attn: IP Docketing Clerk
Locke, Liddell & Sapp LLP
600 Travis, Suite 3400
Houston, Texas 77002
(713) 226-1361

FULL NAME OF SOLE OR FIRST INVENTOR DANIELLE RENEE FORGET SHIELD	INVENTOR'S SIGNATURE 	DATE 3-12-04
RESIDENCE 1810 Southmore Blvd., Houston, Texas 77004		CITIZENSHIP USA
POST OFFICE ADDRESS same as above		

2

Fig. 1A

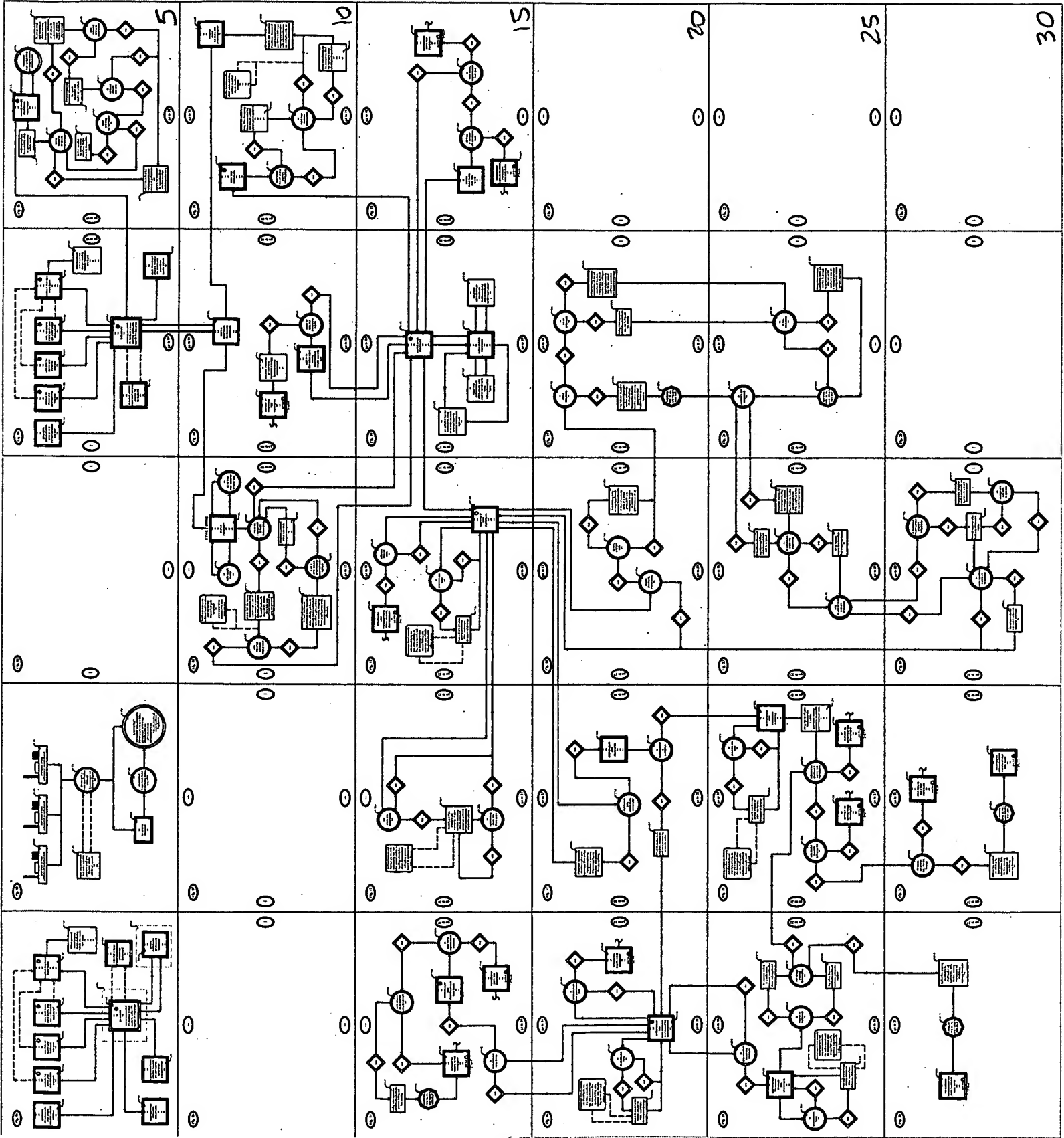


Fig. 01

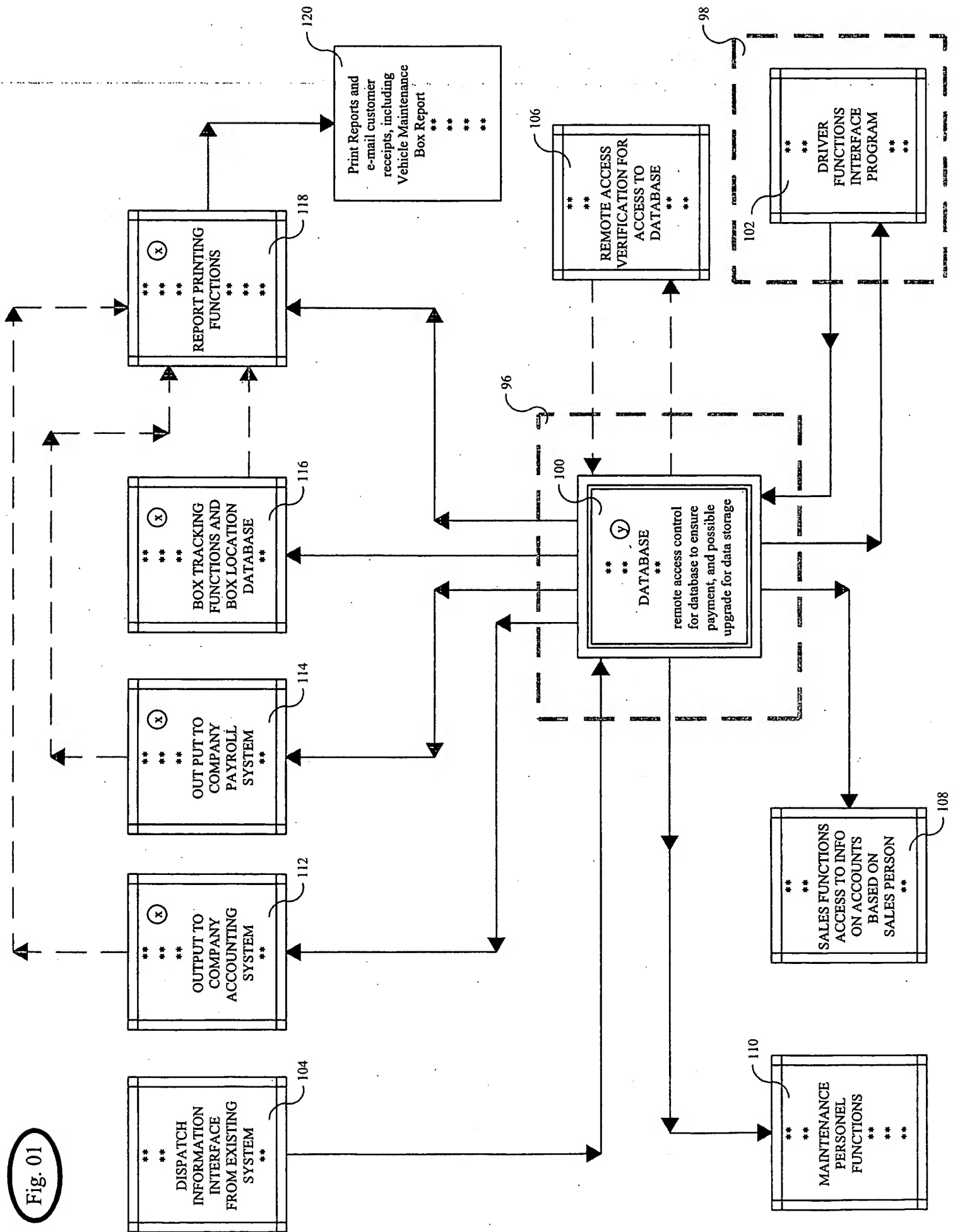


Fig. 02

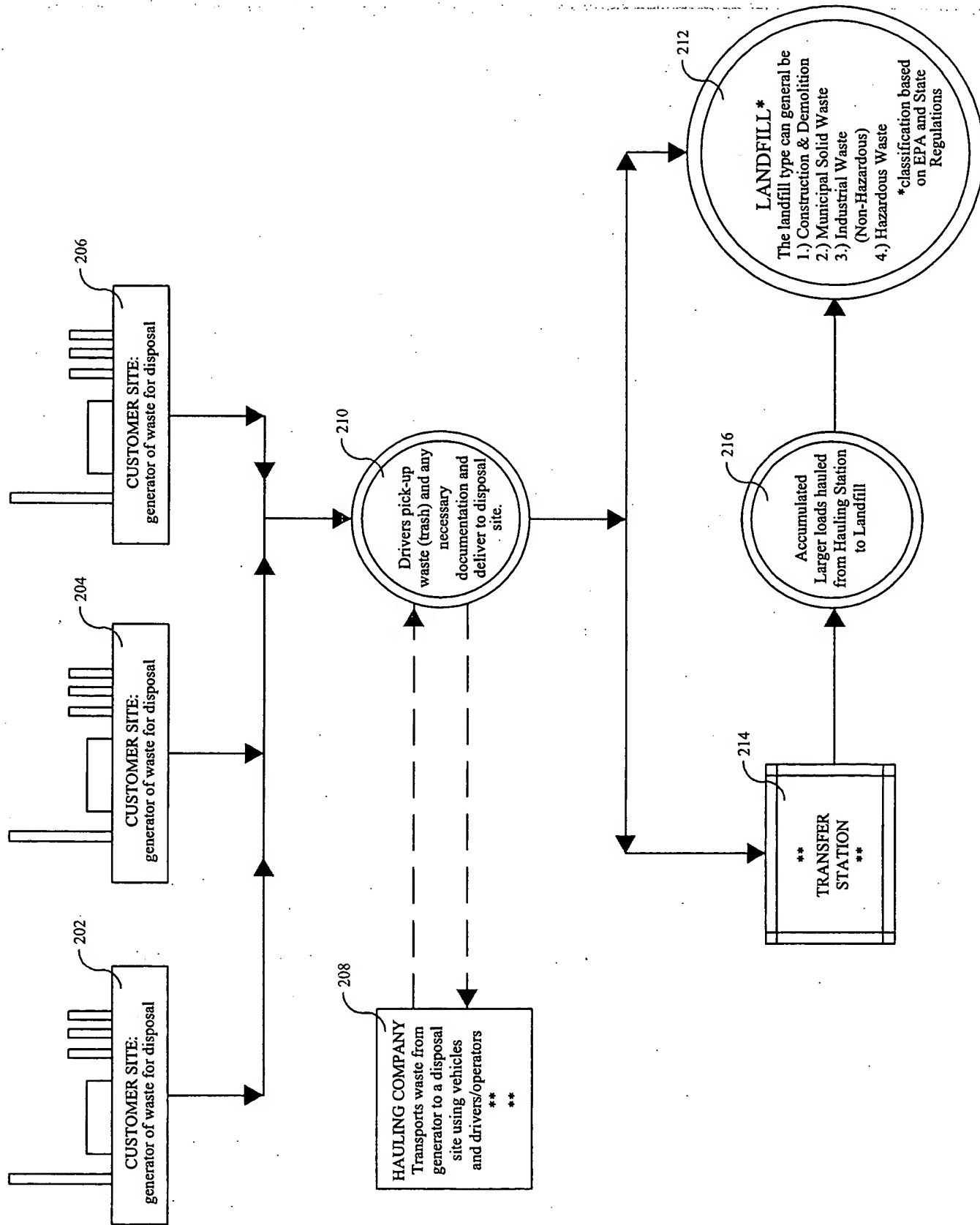


Fig. 04

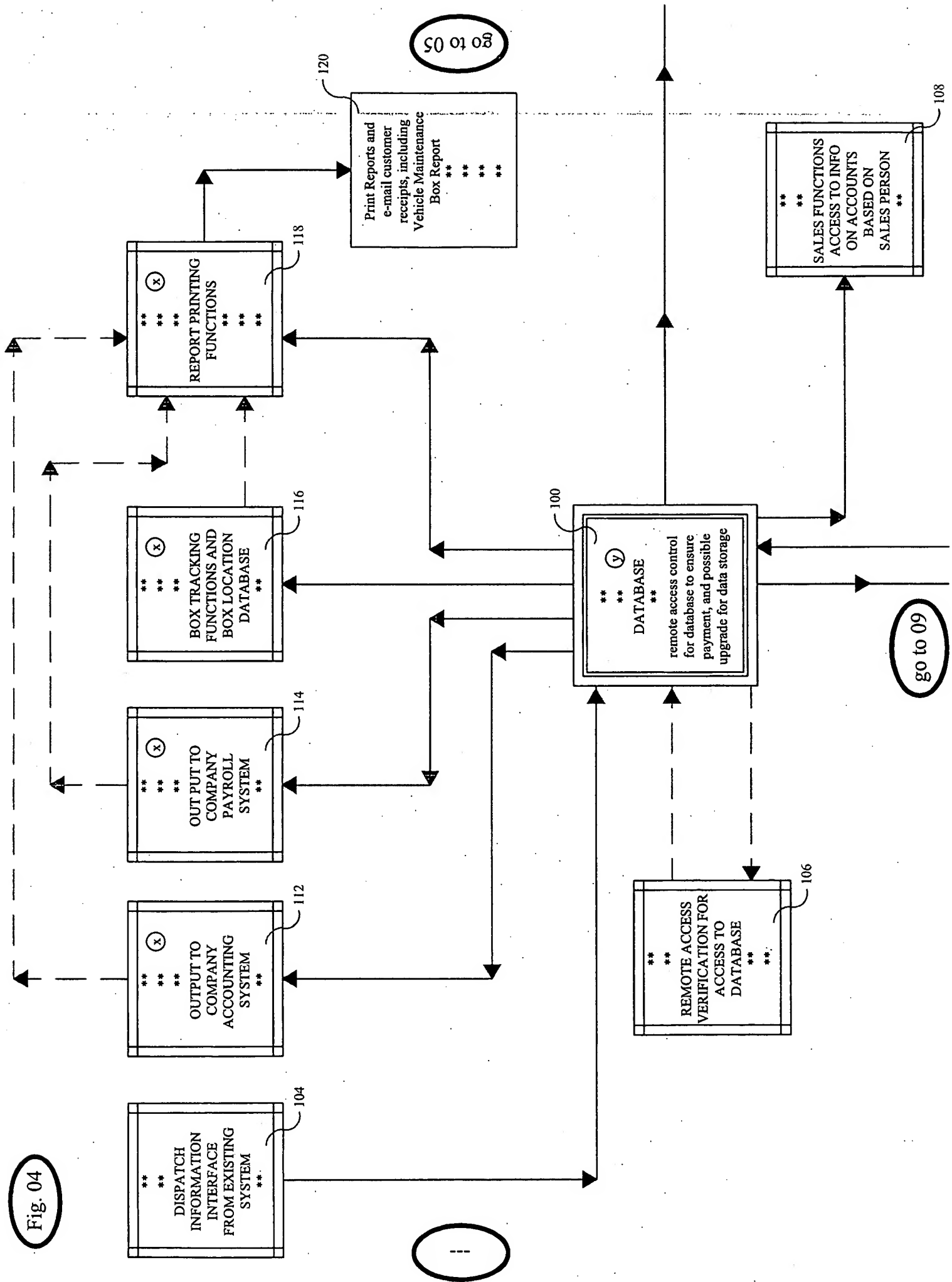
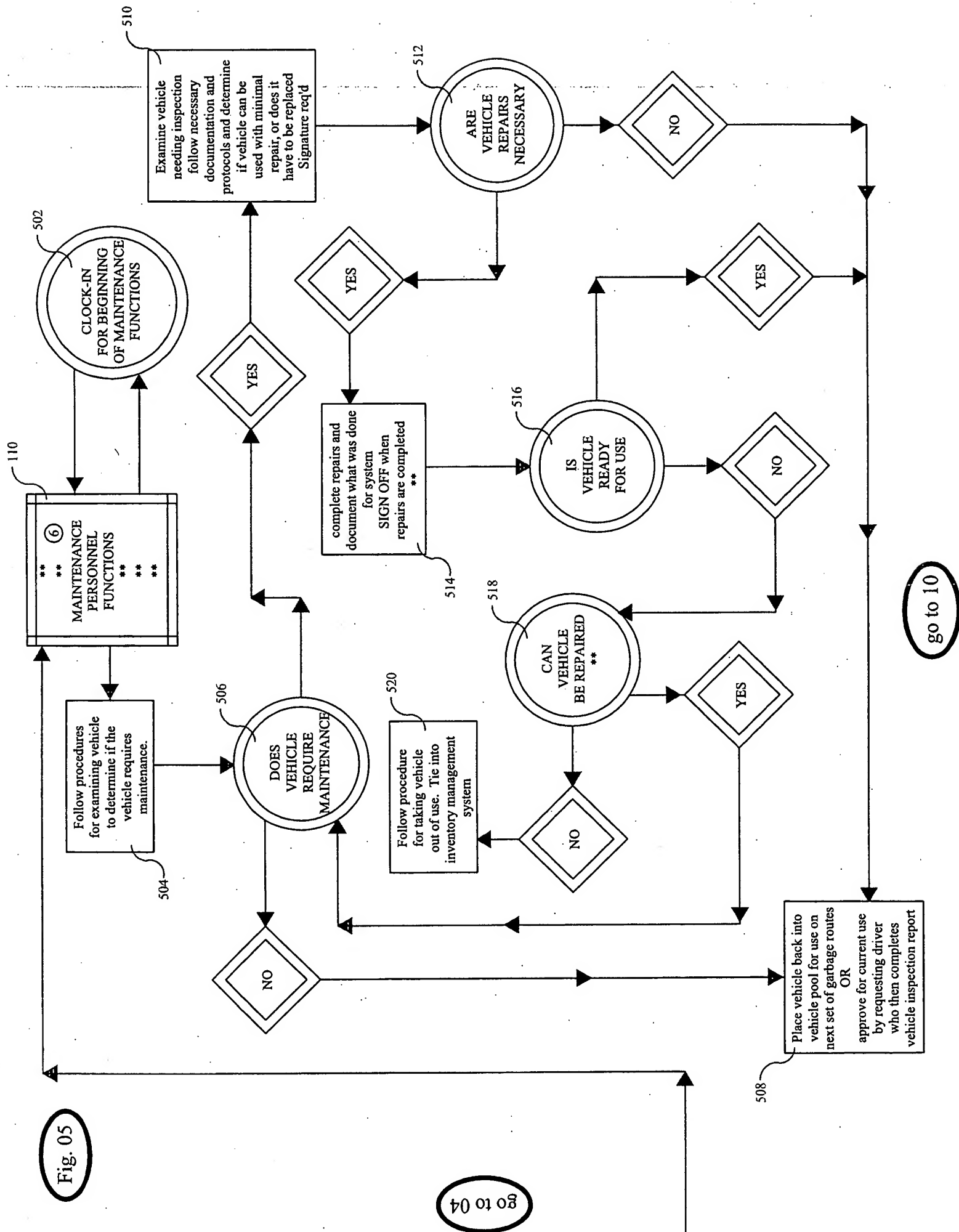
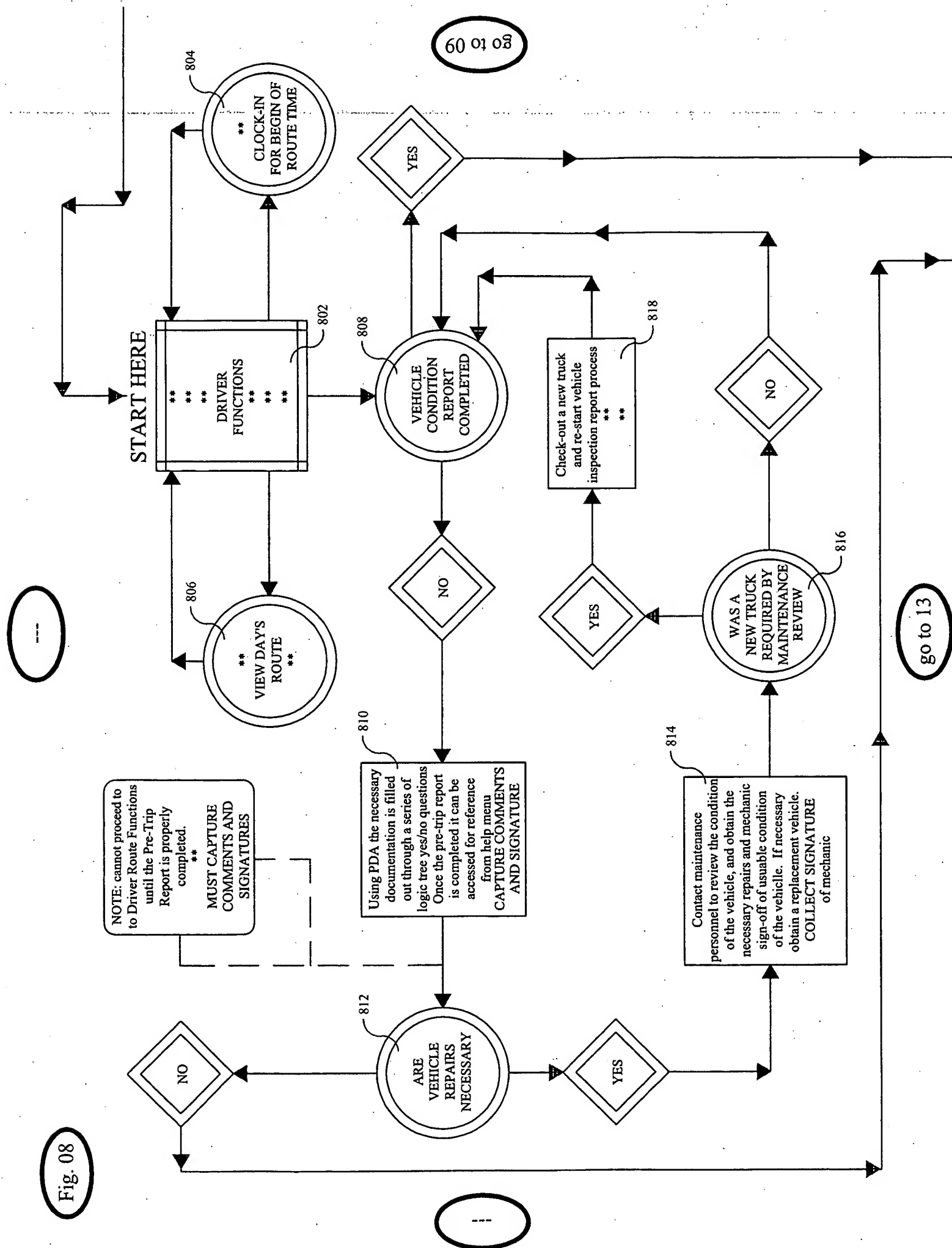


Fig. 05





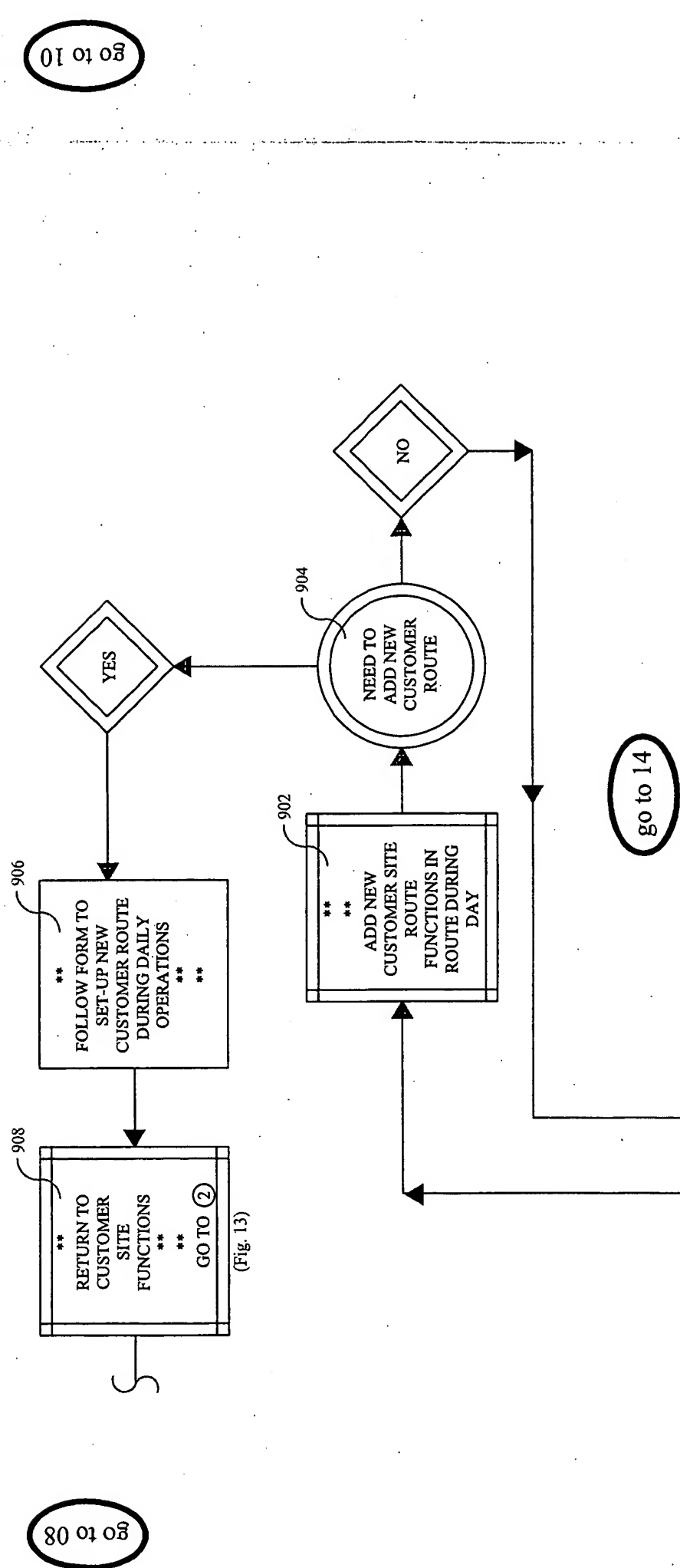
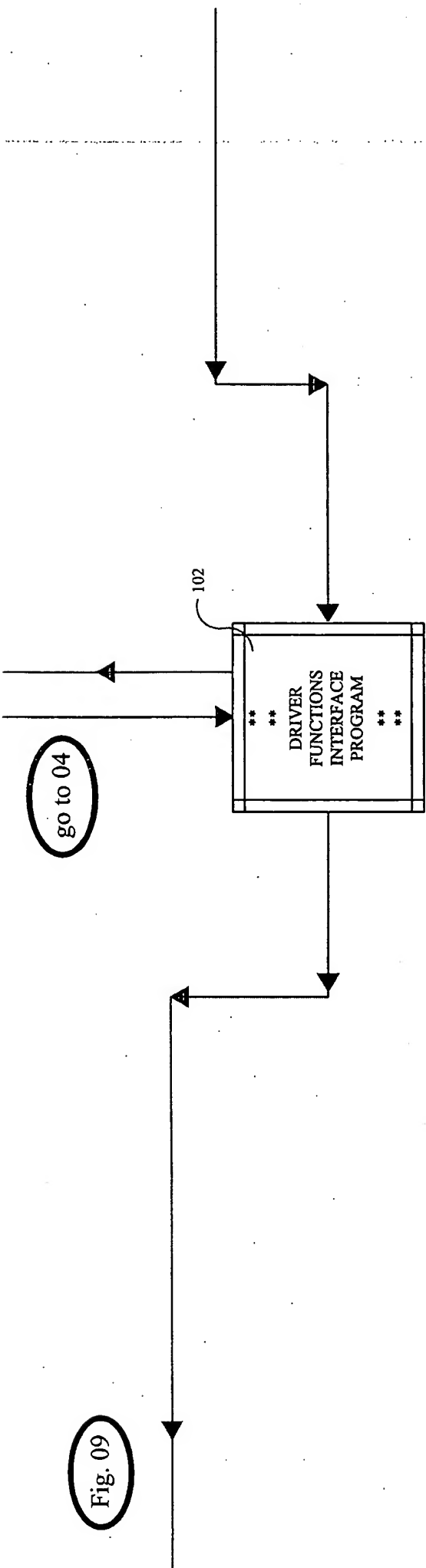
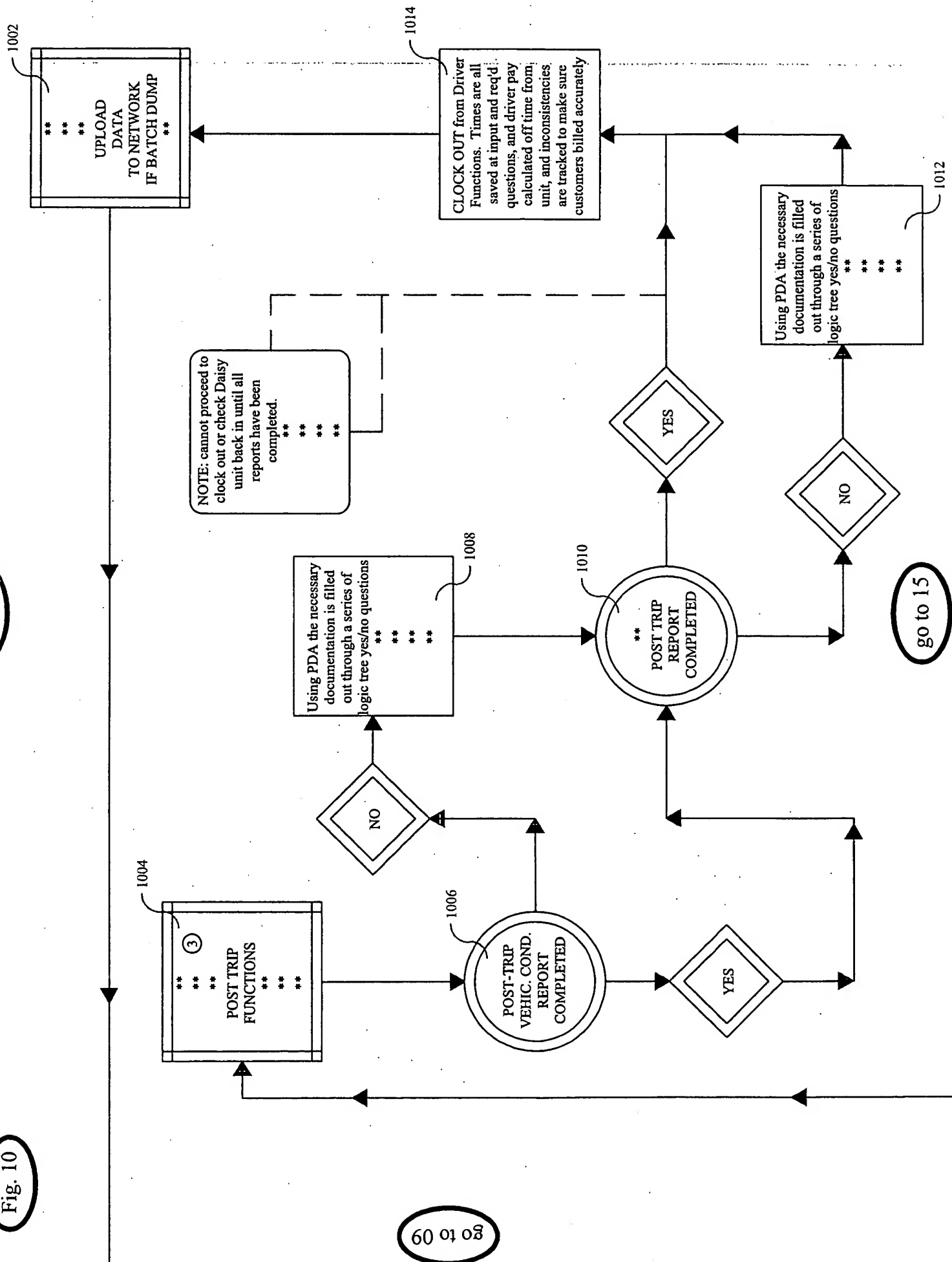


Fig. 10

go to 05

go to 15



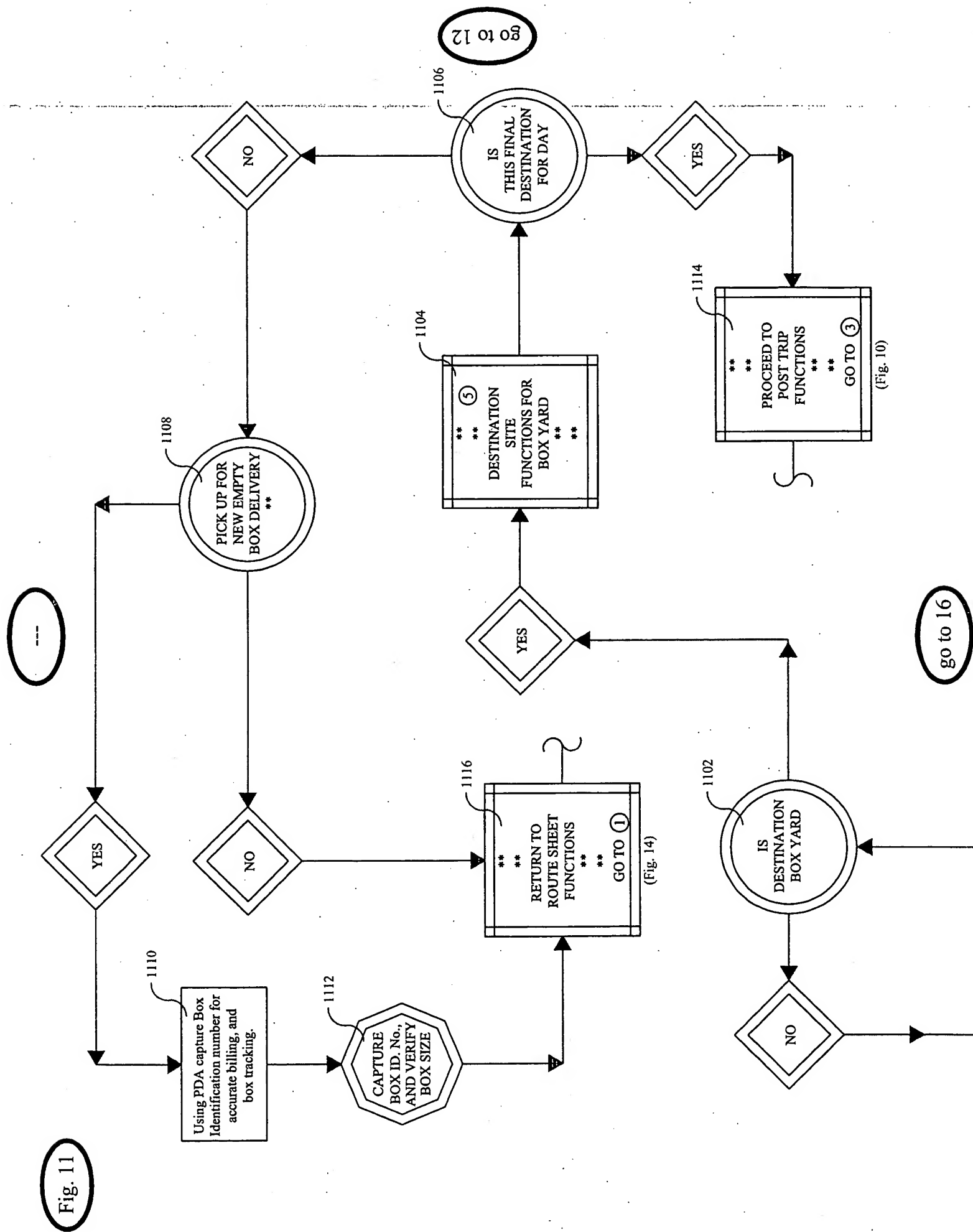
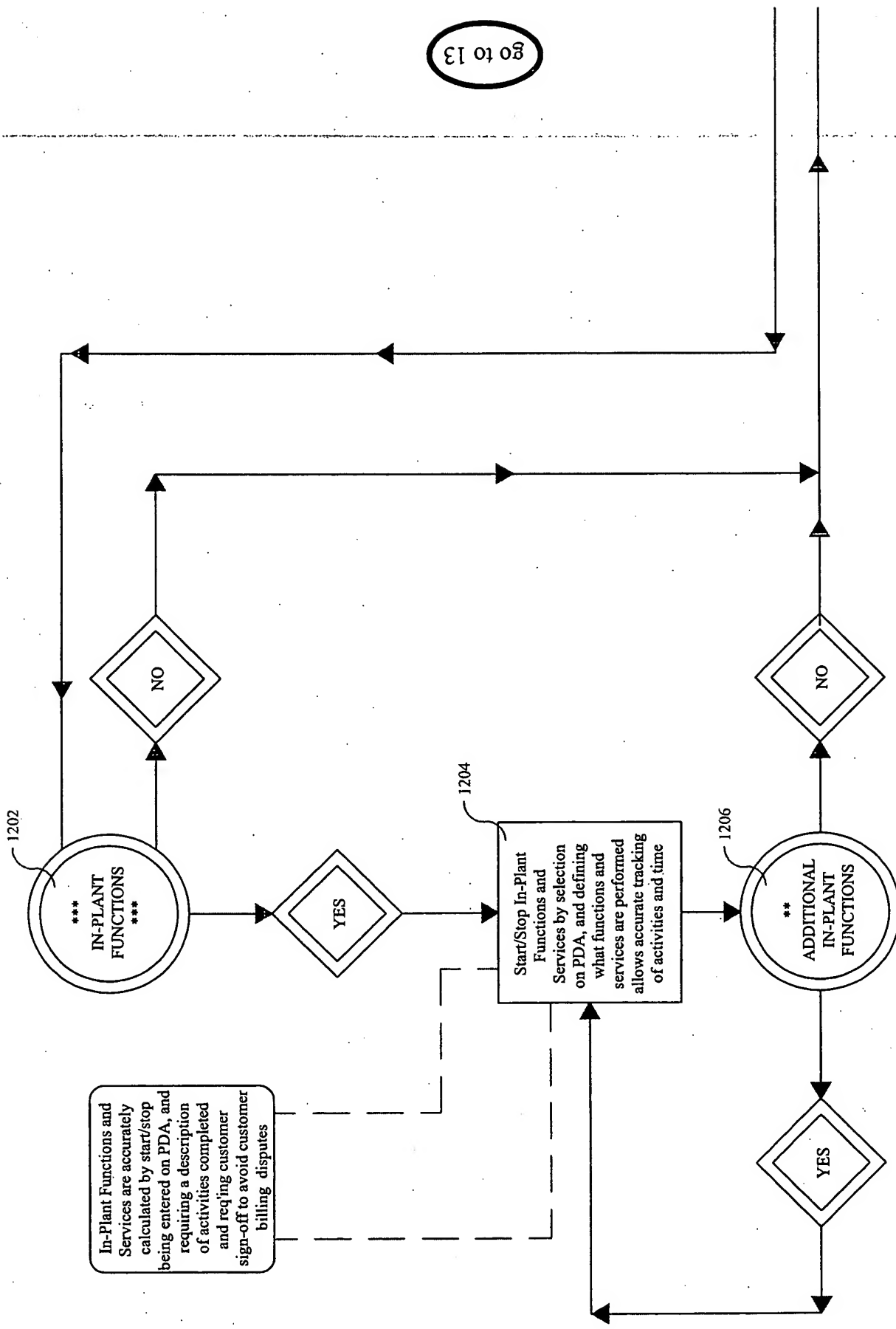


Fig. 12



go to 11

go to 13

go to 17

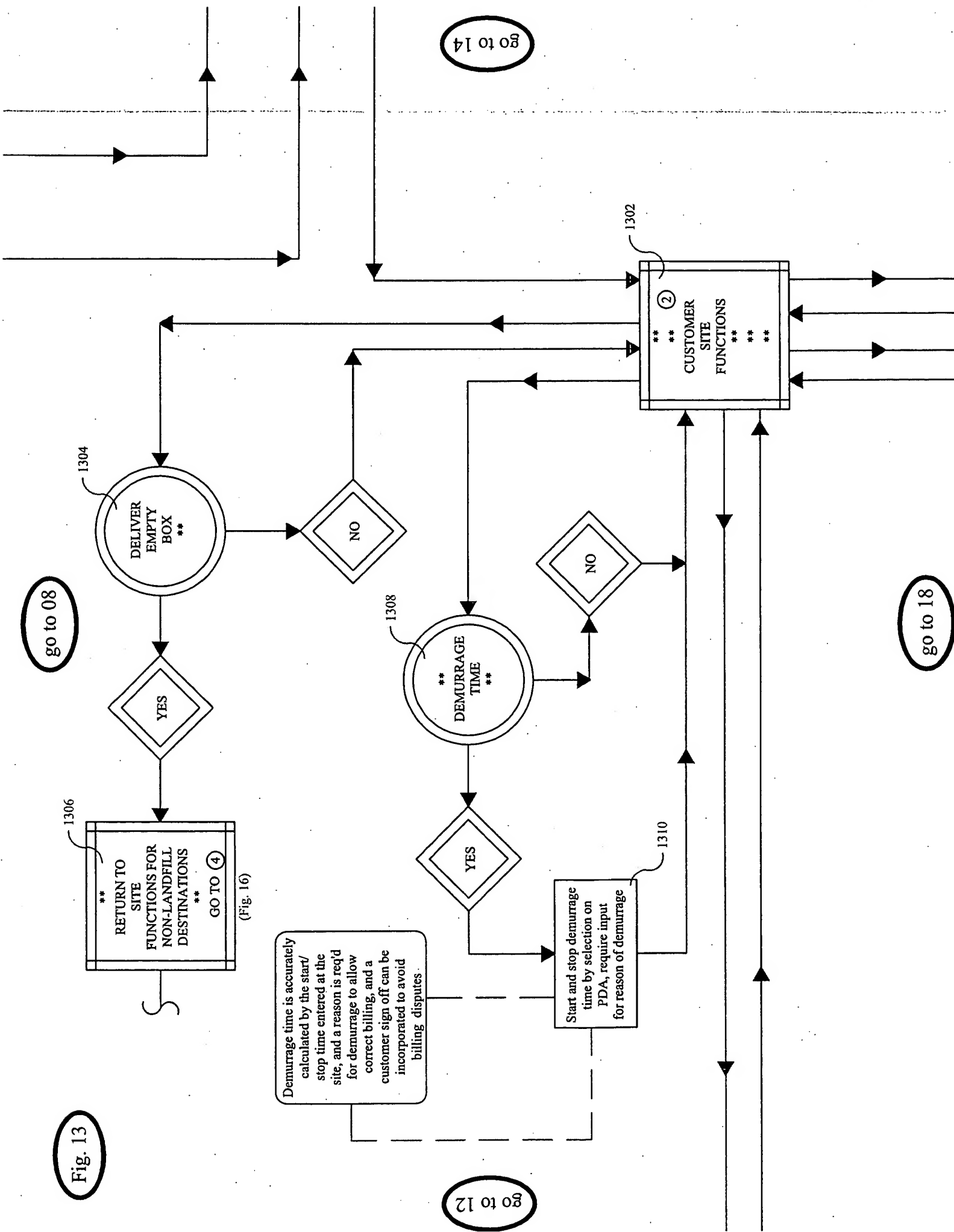


Fig. 14

go to 09

go to 13

go to 15

go to 19

1402

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ROUTE SHEET
FUNCTIONS

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1410

**
CAN ACCESS DRIVER
PRE-TRIP REPORT
IF NECESSARY FOR
INSPECTION, OR
OTHER NECESSARY
REASON
**

1408

**
HELP FOR
QUESTIONS ON
OPERATION AND
USE OF DAISY UNIT
*FAQ
*KEY COMMANDS
*ETC.
**

1404

HELP/UTILITY
FUNCTIONS

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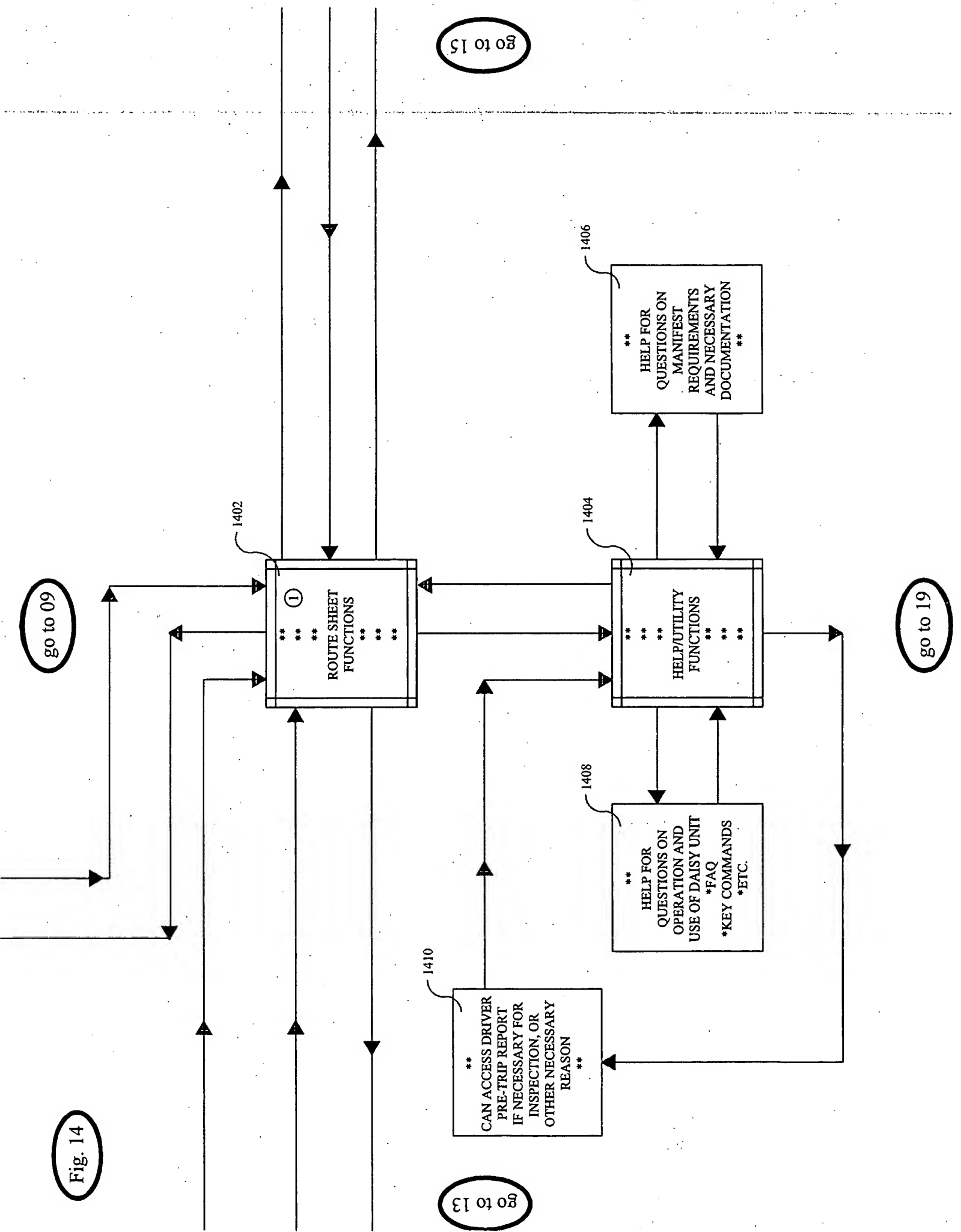
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1406

**
HELP FOR
QUESTIONS ON
MANIFEST
REQUIREMENTS
AND NECESSARY
DOCUMENTATION
**



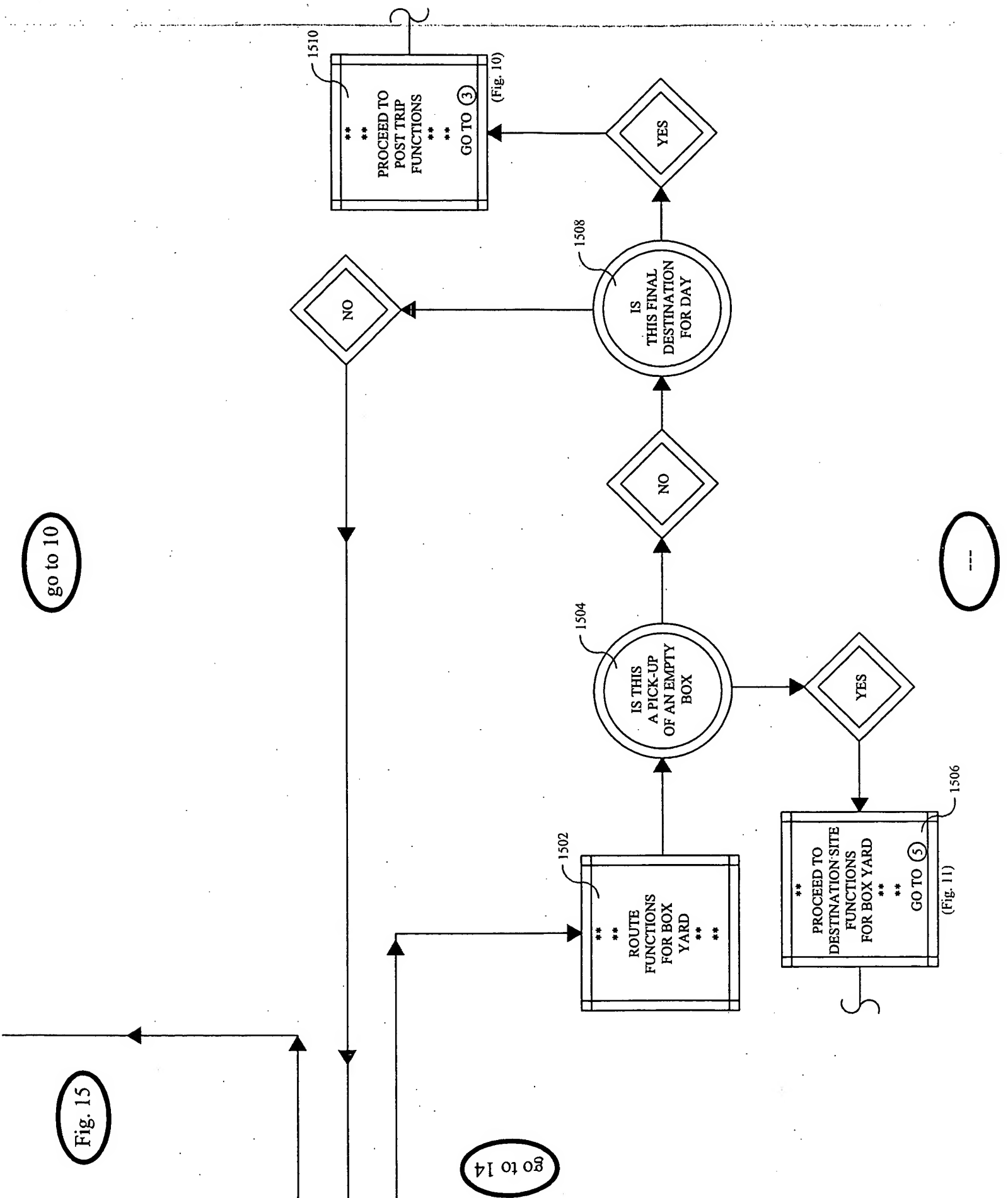
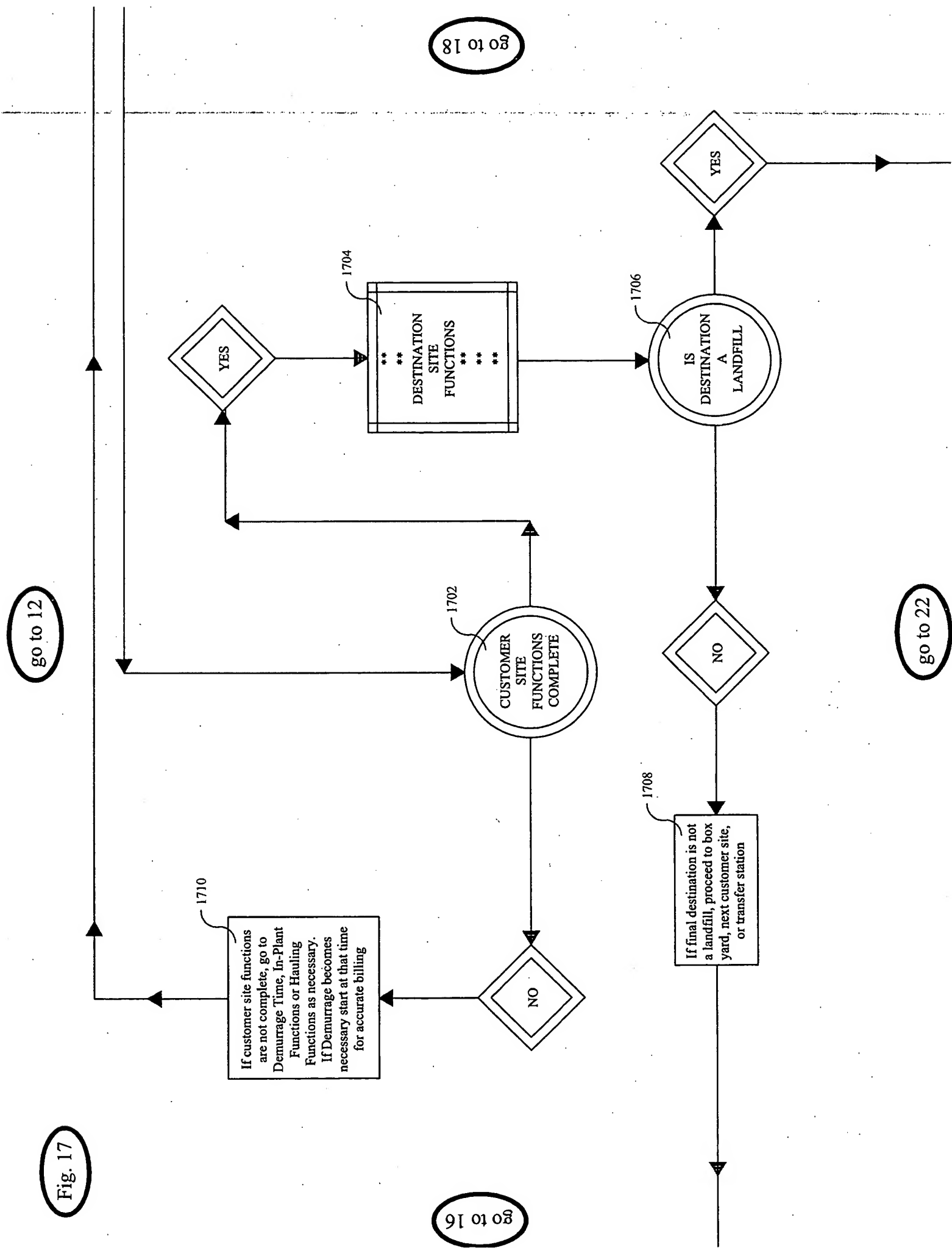


Fig. 15

go to 10

go to 14

Fig. 17



go to 18

go to 16

go to 22

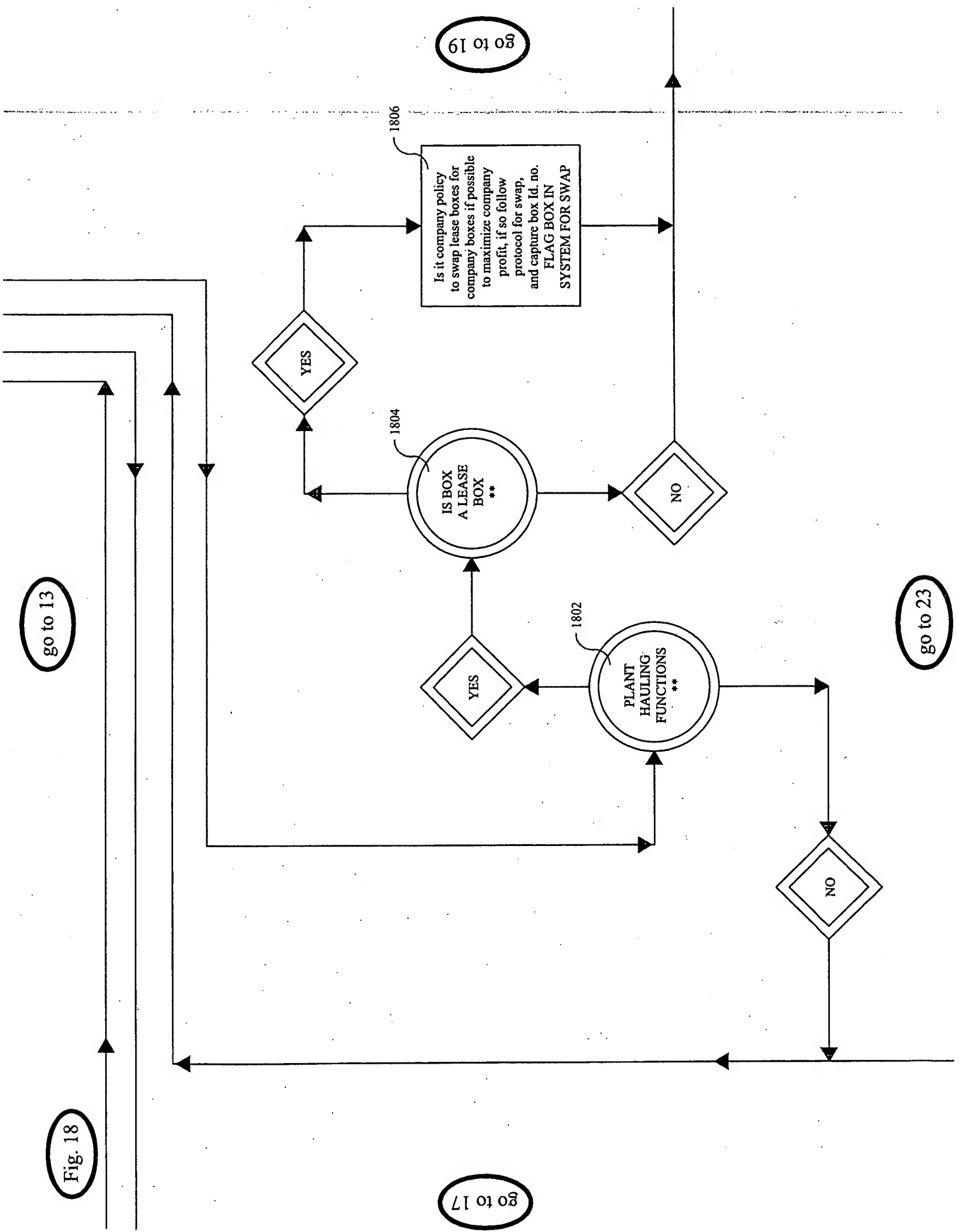
Fig. 18

go to 13

go to 17

go to 23

go to 19

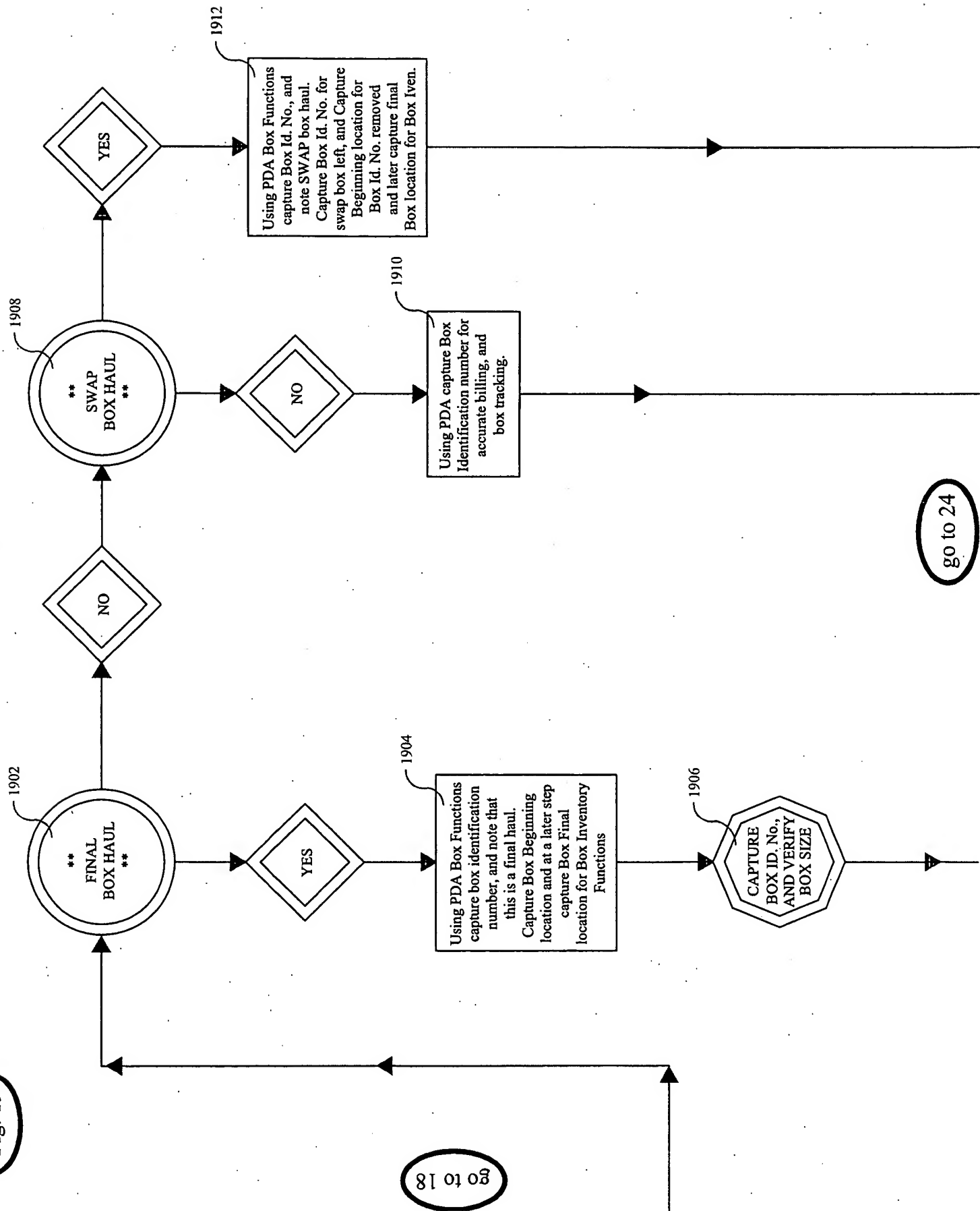


go to 14

go to 24

Fig. 19

go to 18



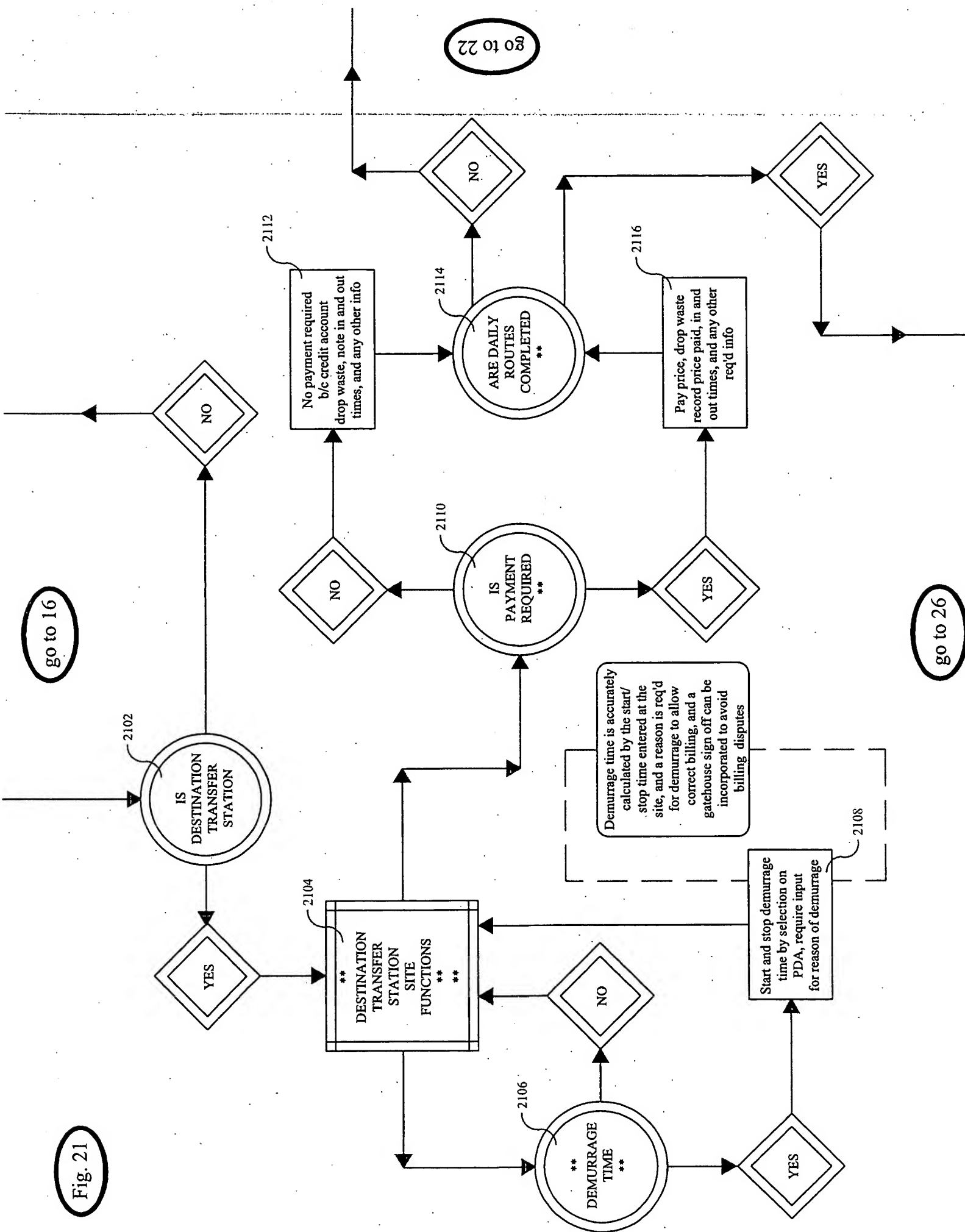
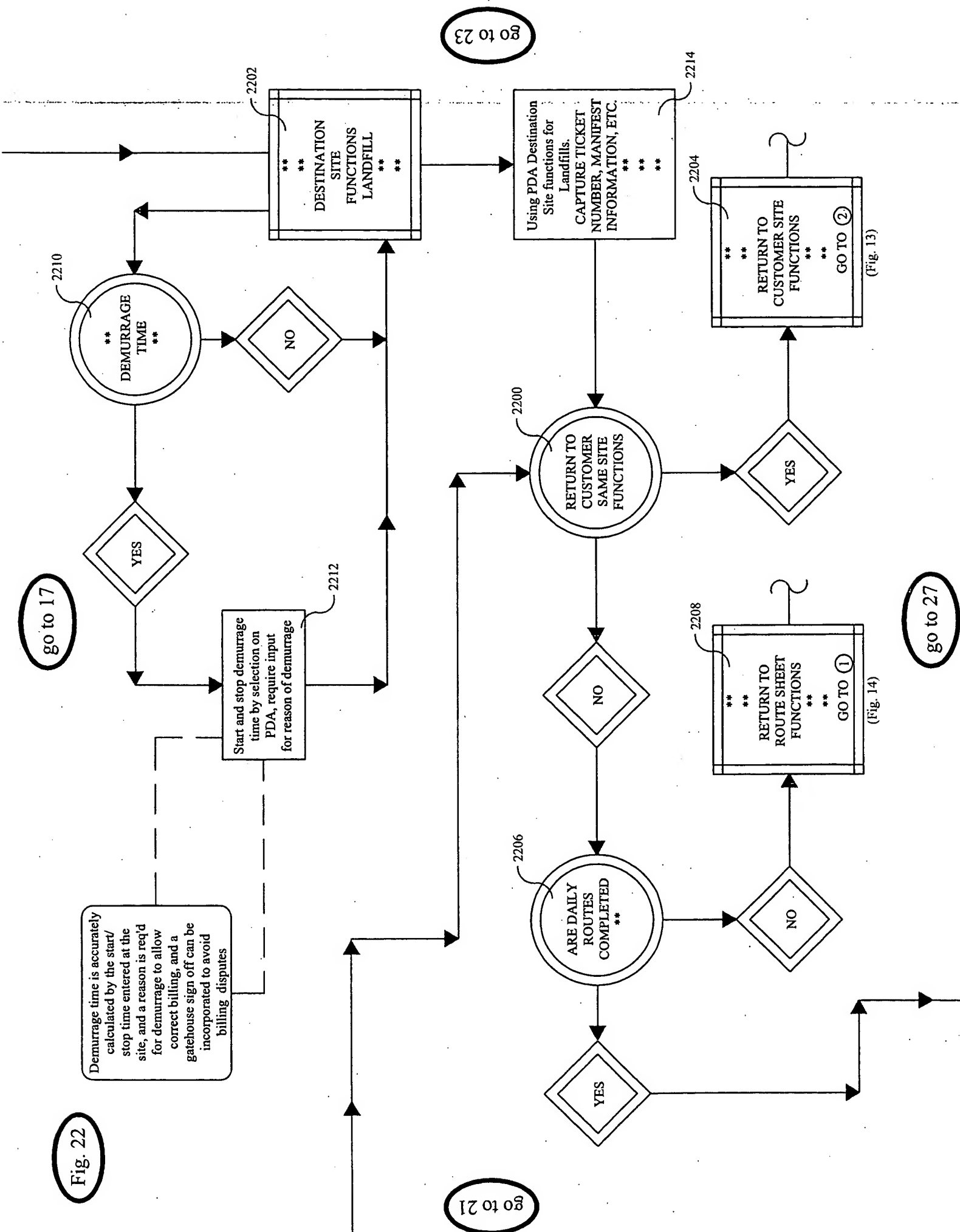


Fig. 22

Demurrage time is accurately calculated by the start/stop time entered at the site, and a reason is req'd for demurrage to allow correct billing, and a gatehouse sign off can be incorporated to avoid billing disputes

go to 17

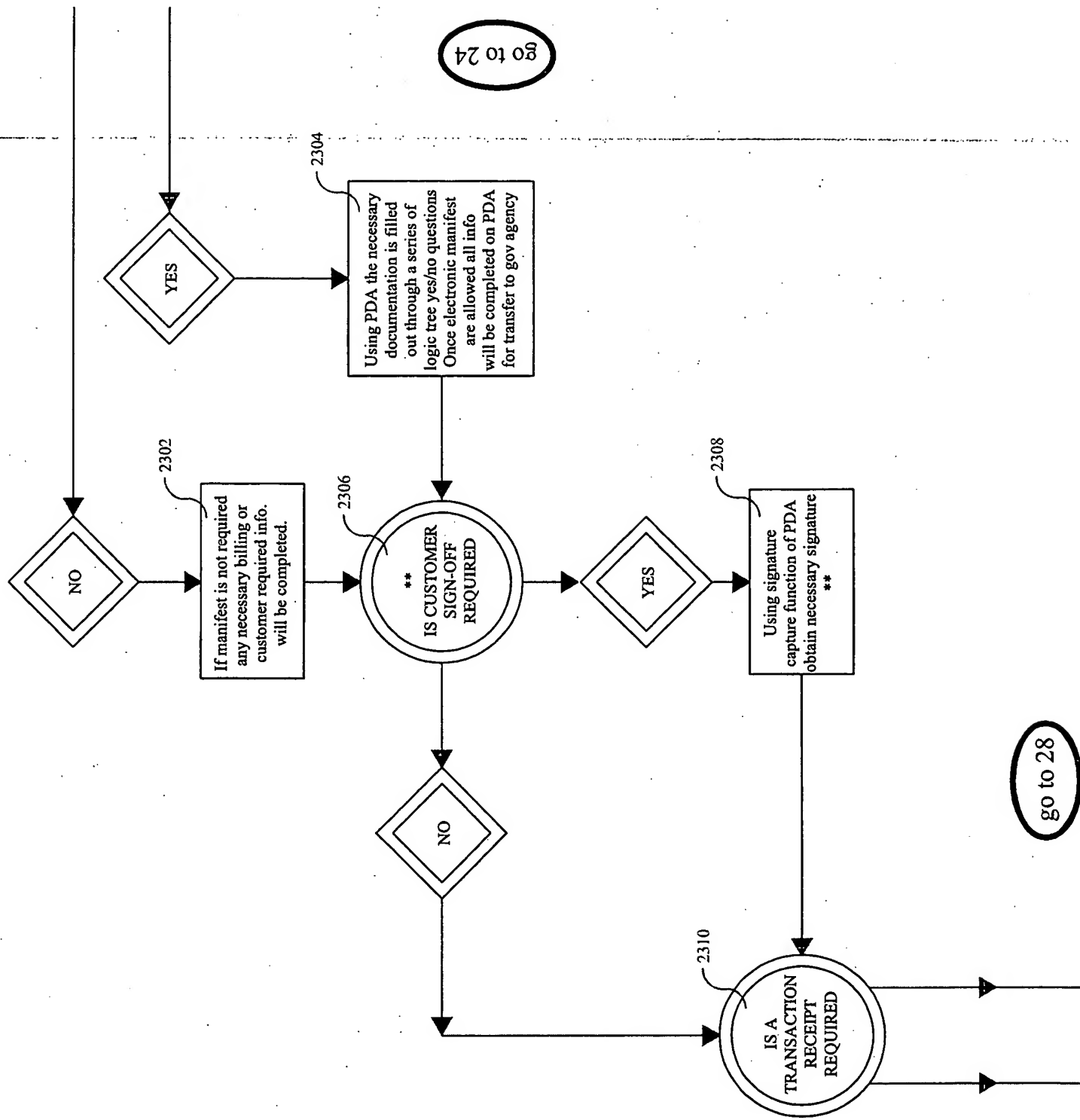


go to 21

go to 23

go to 27

Fig. 23



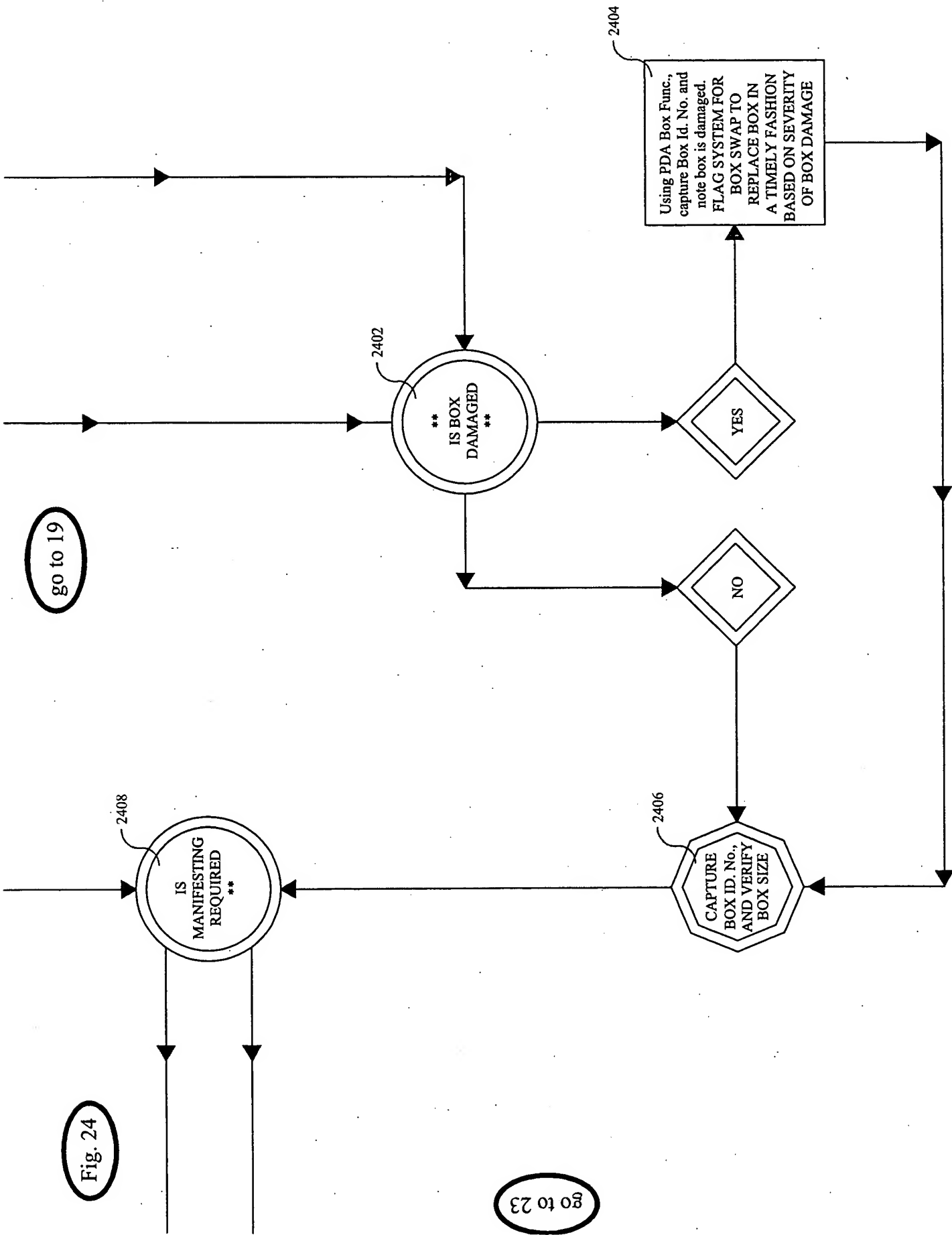
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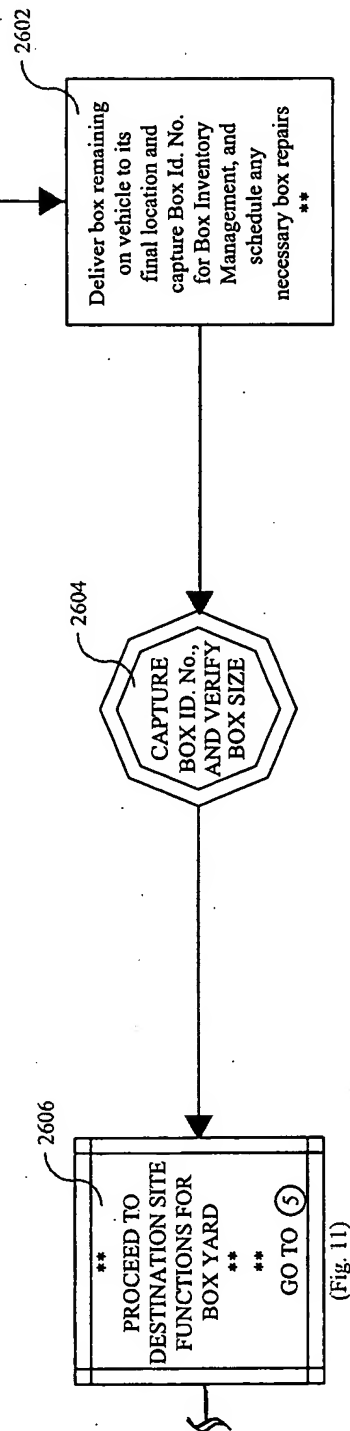
go to 23

Fig. 24

go to 19

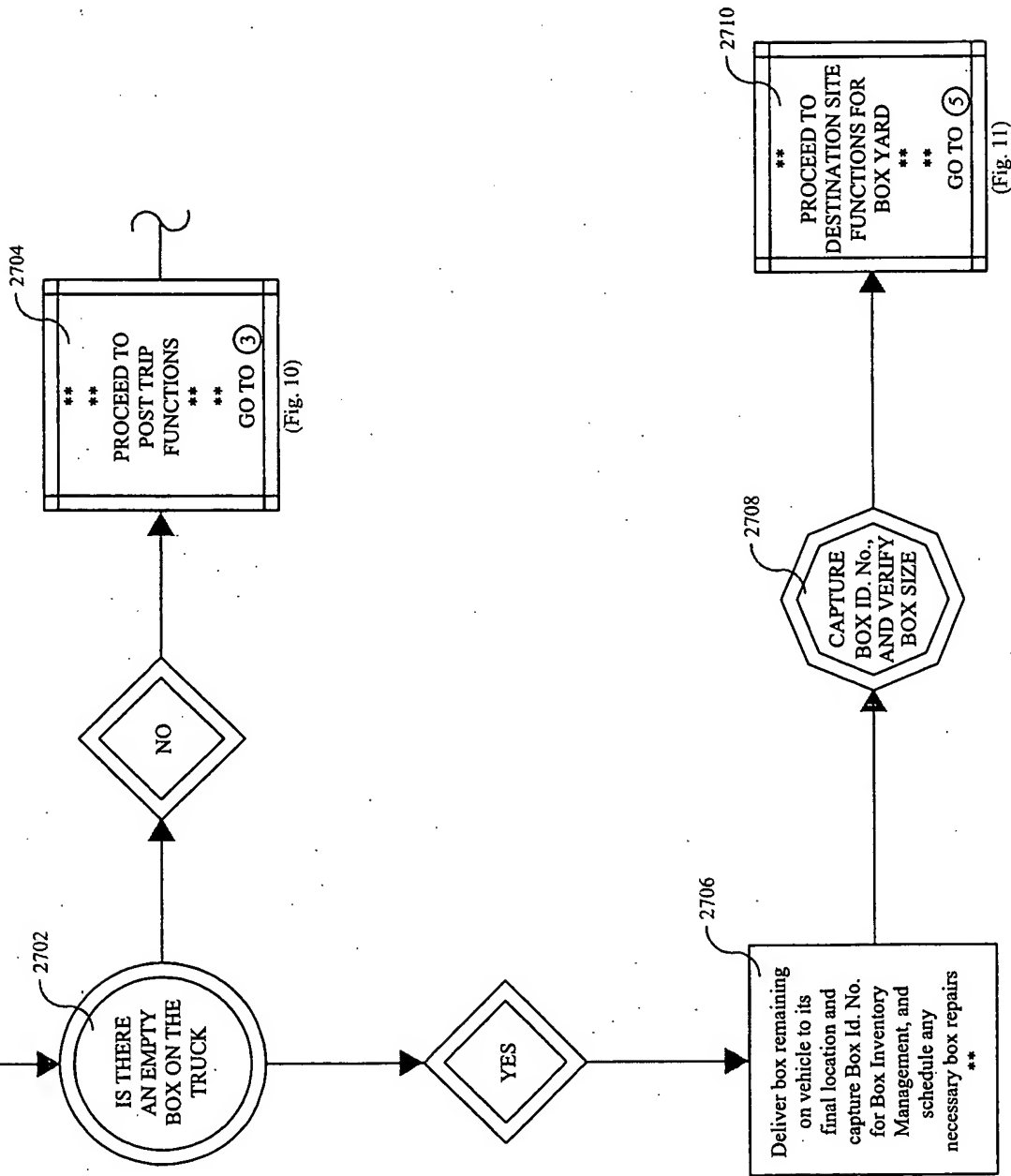
Fig. 26

go to 21

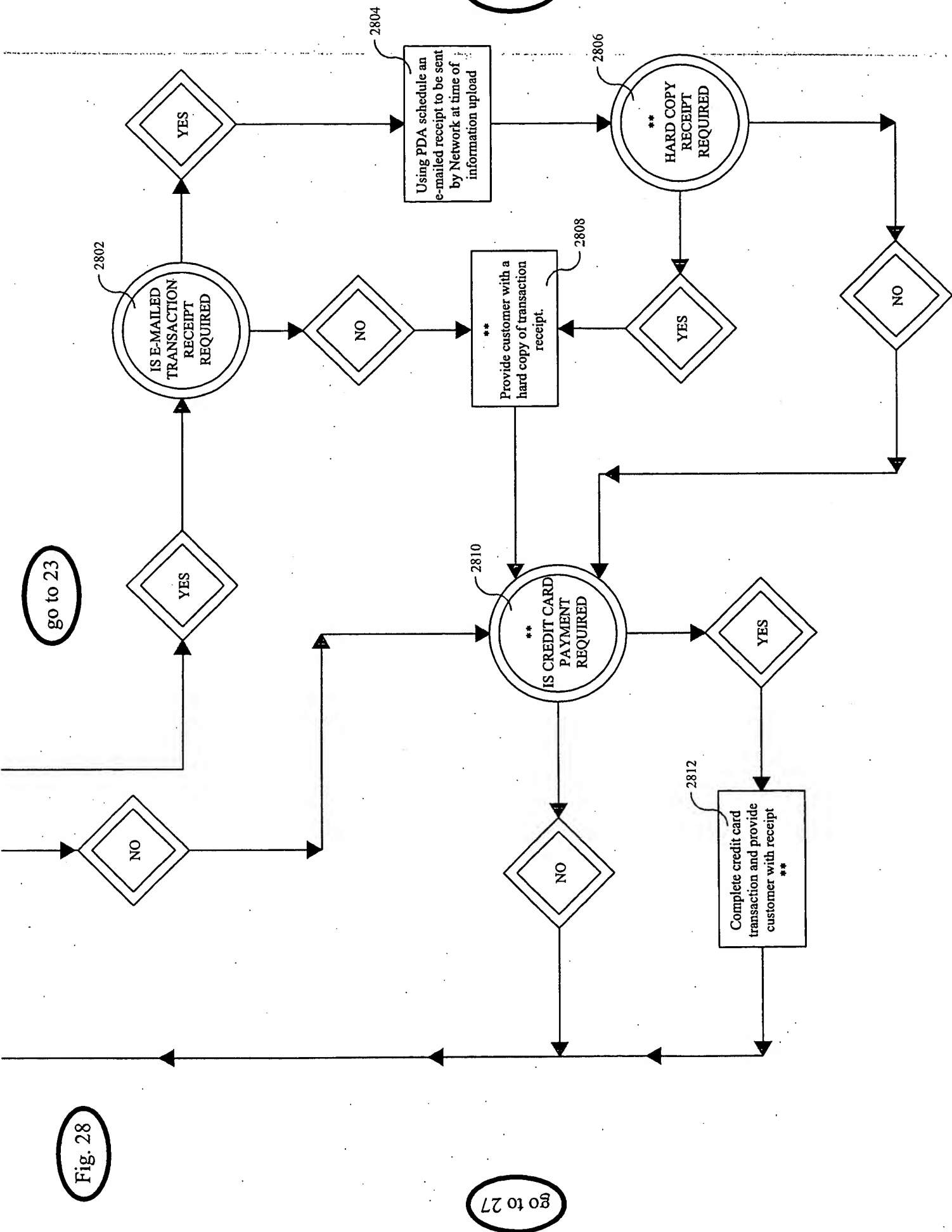


go to 27

Fig. 27



...



DECLARATIONSOLE/JOINT INVENTOR
ORIGINAL/SUBSTITUTE/CIP

As a below named inventor, I hereby declare that: my residence, post office address, and citizenship are as stated below next to my name. I believe I am the original, first, and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

ELECTRONIC WASTE MANAGEMENT SYSTEM

as described in the specification [☒] attached or [☐] of patent Application Serial No. _____, filed _____

and amended on _____.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above; that I do not know and do not believe the same was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application; that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representative or assigns more than twelve months prior to this application; and that I acknowledge the duty to disclose information of which I am aware which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations § 1.56(a). Such information is material when it is not cumulative to information already of record or being made of record in the application, and

(1) it establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or

(2) it refutes, or is inconsistent with, a position the applicant has taken or may take in:

(i) opposing an argument of unpatentability relied on by the Office, or

(ii) asserting an argument of patentability.

I hereby claim foreign priority benefits under Title 35, United States Code § 119 of any foreign application(s) for patent or inventor's certificates listed below and have also identified below any foreign application(s) having a filing date before that of the application(s) on which priority is claimed:


COUNTRY	APPLICATION NUMBER	DATE OF FILING	PRIORITY CLAIMED UNDER 35 USC 119
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO

I hereby claim the benefit under Title 35 United States Code § 120 of any United States application(s) listed below and, insofar as any subject matter of any claim of this application is not disclosed in the prior United States Application, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations § 1.56(a) which occurred between the filing date of the prior application and the national PCT international filing date of this application:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Please direct all written communications to the address listed below: All telephone calls should be directed to D. Brit Nelson at (713) 226-1361.

D. Brit Nelson
Attn: IP Docketing Clerk
Locke, Liddell & Sapp LLP
600 Travis, Suite 3400
Houston, Texas 77002
(713) 226-1361

FULL NAME OF SOLE OR FIRST INVENTOR DANIELLE RENEE FORGET SHIELD	INVENTOR'S SIGNATURE 	DATE 3-12-04
RESIDENCE 1810 Southmore Blvd., Houston, Texas 77004	CITIZENSHIP USA	
POST OFFICE ADDRESS same as above		

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	§	Examiner: To Be Assigned
	§	
Shield	§	
	§	
Serial No.: To Be Assigned	§	
	§	Group Art Unit: To Be Assigned
Filed: Concurrently Herewith	§	
	§	
For: Electronic Waste Management System	§	
	§	Attorney Docket No. 020976-00100

POWER OF ATTORNEY BY ASSIGNEE

Under the provisions of 37 C.F.R. §3.71 and §3.73, the undersigned Assignee of record of the entire right, title and interest in the above-identified patent/patent application by virtue of an assignment recorded (check as applicable):

- ☒ Concurrently Herewith
- ☐ Date Recorded ____
- ☐ Reel ____ Frame ____

elects to conduct the prosecution of the application/maintenance of the patent to the exclusion of the named inventor(s). The Assignee hereby revokes any previous powers of attorney and appoints the following to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

D. Brit Nelson, Reg. No. 40,370
 John Wilson Jones, Reg. No. 31,380
 Steven S. Boyd, Reg. No. 42,353

Please direct all written communications to:

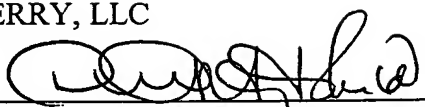
Attn: IP Docketing Clerk
Locke, Liddell & Sapp LLP
600 Travis, Suite 3400
Houston, Texas 77002

Please direct all telephone calls to:

D. Brit Nelson
(713) 226-1361
(713) 229-2638 (Facsimile)

ASSIGNEE
DAFFENBERRY, LLC

Date: 3-12-04

BY: 
NAME: DANIELLE RENEE FORGET SHIELD
TITLE: *Managing Member*

RECORDATION FORM COVER SHEET

PATENTS ONLY

U.S. DEPARTMENT OF COMMERCE

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1. Name of conveying party(ies):

Danielle Renee Forget Shield

2. Name and address of receiving party(ies)

Name: DAFFENBERRY, LLC

Internal Address: _____

Additional name(s) of conveying party(ies) attached? ☐ Yes ☒ No

3. Nature of conveyance:



Assignment



Merger



Security Agreement



Change of Name



Other _____

Street Address: 1810 Southmore Blvd.City: Houston State: TX Zip: 77004Execution Date: March 12 2004Additional name(s) & address(es) attached? ☐ Yes ☒ No

4. Application number(s) or patent number(s):

If this document is being filed together with a new application, the execution date of the application is: 03/12/04

A. Patent Application No.(s)

B. Patent No.(s)

Additional numbers attached? ☐ Yes ☒ No

5. Name and address of party to whom correspondence concerning document should be mailed:

Name: D. Brit NelsonInternal Address: Attn: IP Docketing ClerkStreet Address: JP Morgan Chase Tower600 Travis, Suite 3400City: Houston State: TX Zip: 770026. Total number of applications and patents involved: 17. Total fee (37 CFR 3.41).....\$ 40☐ Enclosed☒ Authorized to be charged to deposit account

8. Deposit account number:

12/1322/020976-00100

(Attach duplicate copy of this page if paying by deposit account)

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9. Statement and signature.

*To the best of my knowledge and belief, the foregoing information is true and correct and any attached copy is a true copy of the original document.*D. Brit Nelson

Name of Person Signing

D. Brit Nelson
Signature3/12/04
DateTotal number of pages including cover sheet, attachments, and documents: 1

Mail documents to be recorded with required cover sheet information to:

Commissioner of Patents & Trademarks, Box Assignments
Washington, D.C. 20231

ASSIGNMENT

WHEREAS, I, **DANIELLE RENEE FORGET SHIELD**, have invented certain new and useful methods, devices, and/or systems for which a United States Patent application entitled "**Electronic Waste Management System**" is filed herewith; and

WHEREAS, **DAFFENBERRY, LLC**, a Texas limited liability company, is desirous of acquiring the entire right, title and interest in and to the aforesaid invention throughout the world, and all right, title and interest in, to and under any and all patents of the United States and all other countries throughout the world;

NOW, THEREFORE, for and in consideration of the sum of One Dollar (\$1.00) and for other good and valuable consideration, the receipt of which is hereby acknowledged, I hereby sell, assign, transfer and set over to **DAFFENBERRY, LLC**, all right, title and interest in and to the said invention throughout the world, and said application for U.S. Patent, and any and all divisions, continuations, continuations-in-part and reissues thereof, and any and all patents of the United States and foreign countries which may be granted therefor, the same to be held and enjoyed by **DAFFENBERRY, LLC** for its own use and benefit, and for the use and benefit of its successors, assigns, or other legal representatives, to the end of the term or terms for which said patents of the United States or foreign countries are or may be granted or reissued, as fully and entirely as the same would have been held and enjoyed by me if this assignment and sale had not been made.

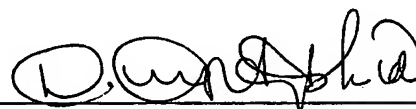
And I hereby authorize and request the Commissioner of Patents and Trademarks and other authorities in foreign countries to issue any and all patents on said invention or resulting from said application and from any and all divisions, continuations, continuations-in-part, and reissues thereof, to **DAFFENBERRY, LLC**, as assignee of my entire interest, and hereby covenant that I have the full right to convey the entire interest herein assigned, and that I have not executed and will not execute any agreement in conflict herewith.

And I further hereby covenant and agree that I will, at any time, upon request, execute and deliver any and all papers that may be necessary or desirable to perfect the title of said invention and to such patents as may be granted therefor, to **DAFFENBERRY, LLC**, its successors, assigns, or other legal representatives and that if **DAFFENBERRY, LLC**, its successors, assigns or other legal representatives shall desire to file any divisional, continuation, or continuation-in-part applications or to secure a reissue of such patents, or to file a disclaimer relating thereto, will upon request, sign all papers, make all rightful oaths and do all lawful acts requisite for the filing of such divisional or continuation applications, or such application for reissue and the procuring thereof, and for the filing of such disclaimer, without further compensation but at the expense of said assignee, its successors, or other legal representatives.

And I do further covenant and agree that I will, at any time upon request, communicate to **DAFFENBERRY, LLC**, its successors, assigns or other legal representatives, such facts

relating to said invention and patents or the file history thereof as may be known to me, and testify as to the same in any interference or other litigation when requested so to do, without further compensation but at the expense of said assignee, its successors, or other legal representatives.

EXECUTED THIS 12 day of March, 2004.



DANIELLE RENEE FORGET SHIELD

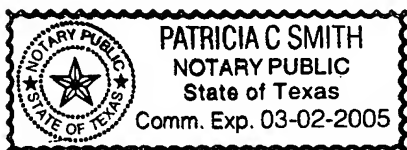
STATE OF TEXAS

§
§
§

COUNTY OF HARRIS

BEFORE ME, the undersigned authority, on this day personally appeared **DANIELLE RENEE FORGET SHIELD**, known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that she executed the same for the purposes and consideration therein expressed.

GIVEN UNDER MY HAND and seal of office this 12th day of March, 2004.



**NOTARY PUBLIC IN AND FOR
THE STATE OF TEXAS**

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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet	1	of	2
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Complete if Known

Application Number	To Be Assigned
Filing Date	Herewith
First Named Inventor	Danielle Renee Forget Shield
Art Unit	
Examiner Name	
Attorney Docket Number	020976-00100

U. S. PATENT DOCUMENTS

[illegible]

FOREIGN PATENT DOCUMENTS

[illegible]

Examiner Signature		Date Considered	
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This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, Washington, DC 20231.

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		Application Number	To Be Assigned
		Filing Date	Herewith
		First Named Inventor	Danielle Renee Forget Shield
		Art Unit	
		Examiner Name	
Sheet	2	of	2
		Attorney Docket Number	020976-00100

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
		HAYHURST, "Onyx 'Laptops' Workers to Automate Pickups," Waste News, Feb. 2, 2004, Crain Communications, Inc., U.S.A.	
		TRANSCOMP SYSTEMS, "Software Solutions for the Waste Industry, Products and Services," 2003, Transcomp Systems, Inc., U.S.A.	
		ENVIRONMENTAL INDUSTRY ASSOCIATIONS, "Garbage By The Numbers, An Update on EPA Data," Executive BRIEF, Washington, D.C.	
		JOHNSON, "The Road to Profitability: Trash firms key on routes," Waste News, July 21, 2003, Crain Communications, Inc., U.S.A.	
		FICKES, "8th Annual Software & Scales Supplement: The Waste Industry Bytes Back," Waste Age, Mar. 1, 1999, WasteAge.com, U.S.A.	
		FICKES, "Nothing But 'Net," Waste Age, Mar. 1, 2001, WasteAge.com, U.S.A.	
		ROTH, "Onboard Data Systems: Start your cost-containment efforts with the efficiency of your collection and transfer operations," MSW Management, 2004, U.S.A.	
		BADER, "Data Onboard," MSW Management, 2003, U.S.A.	

Examiner Signature		Date Considered	
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Onyx 'laptops' workers to automate pickup

By Tracy Hayhurst

LOMBARD, ILL. — In this age of fast-moving technological innovations, five years may seem like an eternity to develop and implement a field computer system to handle hazardous waste shipments.

But representatives from Onyx Environmental Services, based in the Chicago suburb of Lombard, Ill., say the time was well spent.

The firm, a division of Paris-based Veolia Environnement, now sends its laptop-equipped sales force to pick up and transport a wide range of hazardous waste, whether 30 grams of a toxic chemical or 50 barrels of sandblast grit, said Jim Dykhuis, director of marketing for Onyx North America.

Workers in the field carried computers prior to the software's debut, but the laptops functioned more as portable typewriters. Now, the upgraded system allows Onyx employees to view a client's entire history and profile of waste shipments and to update an account immediately, said Kyle Raabe, Onyx's project manager for the new field system.

"All the background information for a customer is put into the computer by the accounting reps and sales reps, so you have profiling and inventories of the

it and determine how to ship it.

"The goal is for every one of our teams, by the end of the day or project, to have the waste packaged, labeled and put on a truck," Raabe said.

Clients run the gamut, from Fortune 500 companies that treat tons of waste annually to individual grade schools that need to dispose of small amounts of science project materials.

"We have one division that picks up from auto body centers — 15,000 auto body shops," Dykhuis said. "Another group does lighting waste. Our core business is true hazardous waste generators, and we have about 5,000 of those."

Each of those customers then has secure access, via phone or Internet, to information about its accounts and shipments, making it easy to generate the paperwork needed to comply with local, state and federal regulations or enforcement actions, Raabe said.

"The data we generate won't actually do the report for you, but it lays it out so that you can easily fill out a report on paper or electronically," Raabe said.

The price of the field tracking system is difficult to pinpoint because it is wrapped into existing services and is a standard operating procedure now for Onyx with each client, Dykhuis said.

"It was no small cost [to devel-

prises for the customers."

Raabe said some of the company's competitors are still writing things out by hand. "Our system is automated and ties into the shipping of every container, whether it's tiny or the size of a tanker," he said.

The method is similar to the model used by shipping and delivery giant UPS. Every package gets a bar code, and customers can track its progress in real time, Raabe said.

"You can track the waste to its facility," he said. "One of the things we pride ourselves on is that you can track your shipments with a phone call or computer. You have the security of being able to say it left our facility on this day and arrived at its disposal site however many hours or days later."

If an Onyx employee encounters unanticipated waste, he or she can handle the situation on the scene by accessing the computer system's chemical library of almost 50,000 chemicals and compounds to determine what is needed for shipping and disposal, then packaging the material and removing it that same day.

Onyx staff members toured the country for about three months to introduce the field tracking system and train employees. Onyx has a U.S. network of more than 40 service centers, treatment facilities, re-

bor is billed on-site by the hour, so that means smaller invoices for our customers. This was a quantum leap in functionality."

For more information, contact Onyx Environmental Services at (830) 218-1763 or visit www.onyxyz.com. ■

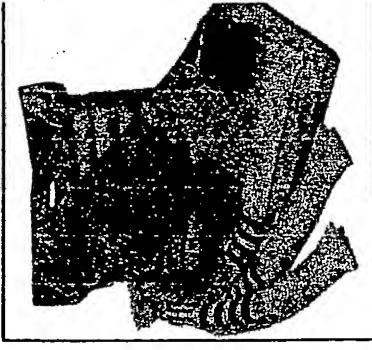
VERMEER MANUFACTURING CO. has introduced the HG8000, a horizontal grinder for recycling organic waste. The grinder is available with either a 525- or a 630-horsepower engine. Key features include a top-loading millbox, removable anvil design, six super single tires with aluminum wheels and fifth wheel towing package. Other standard features include an HPTO clutch, the patent-pending SmartGrind system and the patented Duplex Drum system.

For more information, call (641) 621-3141 or visit www.vermeer.com.

REGENESIS has introduced Metals Remediation Compound, an injectable product designed to treat a wide range of dissolved metals and chlorinated solvents in situ. The compound removes metals and solvents from groundwater safely, quickly, effectively, and at a low cost, according to the company. The product is designed to render

(949) 366-8000 or visit www.genesis.com.

NEW PIG CORP. has introduced the Pig Battery Acid Spill Pack for response to spills of battery acid. Compact, portable and easy to hang, the 16-by-20-inch spill pack contains enough absorbent mats and socks to absorb up to 4 gallons of battery acid and can be stored almost anywhere, the company said. The package includes nitrile gloves, goggles, apron and a large disposal bag with nylon ties for disposal used absorbents.



BATTERY ACID SLURPER-UPPER: NEW PIG CORP.'s Pig Battery Acid Spill Pack contains enough absorbent mats and socks to absorb up to 4 gallons of battery acid, according to manufacturer.

For more information, call (949) 366-8000 or visit www.genesis.com.

o upstage an account immediately," said Kyle Raabe, Onyx's project manager for the new field system.

"All the background information for a customer is put into the computer by the account reps and sales reps, so you have rofling and inventories of the waste," Raabe said. "The overall theme is that if you're looking to discard something, we'll find a home for it."

For example, if pharmaceutical giant Pfizer Inc. e-mails its inventory to Onyx, one of the firm's specialists goes to the site to package the waste or identify

easily fill out a report on paper or electronically," Raabe said.

The price of the field tracking system is difficult to pinpoint because it is wrapped into existing services and is a standard operating procedure now for Onyx with each client, Dykhuys said.

"It was no small cost [to develop], but the hazardous waste business is kind of like a bar fight — competition is tough," he said.

"We had the money to invest in this, and we think it will pay off. We're looking to meet customer expectations and exceed them. This makes sure the pieces of paper match up. There are no sur-

al, then packaging the material and removing it that same day. Onyx staff members toured the country for about three months to introduce the field tracking system and train employees. Onyx has a U.S. network of more than 40 service centers, treatment facilities, recovery and disposal sites and transportation centers.

"When we first rolled it out in March, there were some adjustments, but now a regular user wouldn't want to go back to the old way," Raabe said. "Our reps are doing their jobs in less time; they get home quicker. And la-

an injectable product designed to treat a wide range of dissolved metals and chlorinated solvents in situ. The compound removes metals and solvents from groundwater safely, quickly, effectively, and at a low cost, according to the company. The product is designed to render dissolved metals harmless through the manipulation of geochemical processes such as precipitation, dissolution, oxidation-reduction, and complexation, which control the state and mobility of metals in an aquifer, the company said.

For more information, call

Yeah... We Make That Too!

Marathon's BlokPak® Transfer System is the Ultimate High Volume Transfer Compactor for MSW

Yeah, we make Transfer Systems too! Marathon's BlokPak offers maximum payloads for high volume transfer of MSW.

The system compacts refuse against a vertical steel gate forming 8-10 ft. logs of waste in the large compaction chamber. The logs are then ejected into a transfer trailer.

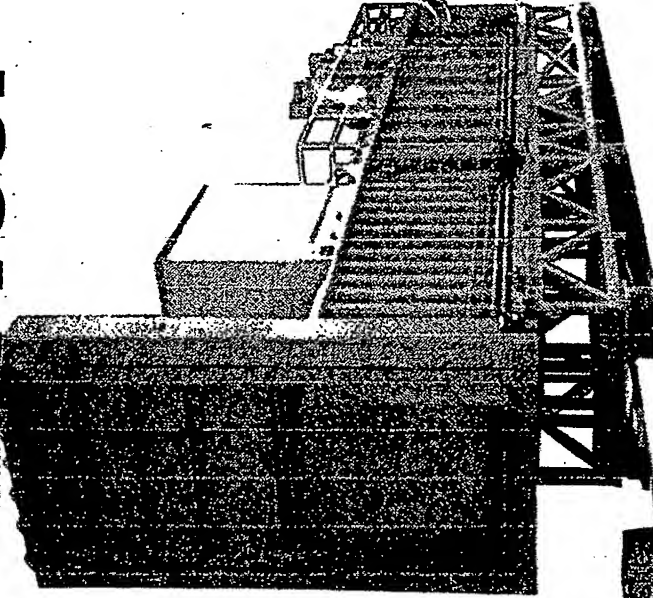
The BlokPak can also be equipped with a weighing system to ensure that you get your maximum payload.



For more information log-on to our web site **www.MarathonEquipment.com**

A DODGE COMPANY

or call **1-800-269-7237** or (205) 695-9105



BATTERY ACID SLURPER-UPPER: New Pig Corp.'s Pig Battery Acid Spill Pack contains enough absorbent mats and socks to absorb up to 4 gallons of battery acid, according to the manufacturer.

For more information, call (800) 468-4647 or visit www.newpig.com.

WORLD'S BEST WEAR PARTS INC., a division of Steel Unlimited Inc., has introduced the Monster III, the largest version of a universally used grinder tip available on the market, according to the company. The tip measures over 4 inches by 5½ inches and includes patented Snug Fit anti-shear rails. The tip is embedded with crushed tungsten carbide on the wear surfaces and comes in a variety of patterns, or the carbide application can be customized to fit a customer's specific wear needs.

For more information, call (800) 544-6453 or visit www.steelunlimited.com.

HAMMEL NORTH AMERICA INC. has introduced the Red Giant, a shredder capable of dealing quickly with large volumes of waste. The shredder is powered by a 640-horsepower CAT C16 engine and can process 200 tons per hour of municipal solid waste or 150 tons per hour of construction and demolition debris. The shredder has a 15-cubic-yard tilting hopper through which material enters; the waste then goes into a shredding chamber and is discharged onto a conveyor belt.

For more information, call (260) 441-7900 or visit www.hammelna.com.

Send product information to Charlotte McCraney at Waste News, 1725 Merriman Rd., Akron, Ohio 44313; by fax to (330) 836-1692; or by e-mail to emccraney@erain.com.

WASTE NEWS

www.wastenews.com

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February 2, 2004

The News Source for Businesses that Generate and Manage Waste

\$3.00

SOLID ■ HAZARDOUS ■ WATER ■ AIR

Utility industry feels regulatory pinch

Bush administration suit may go to trial

By Bruce Gelselman

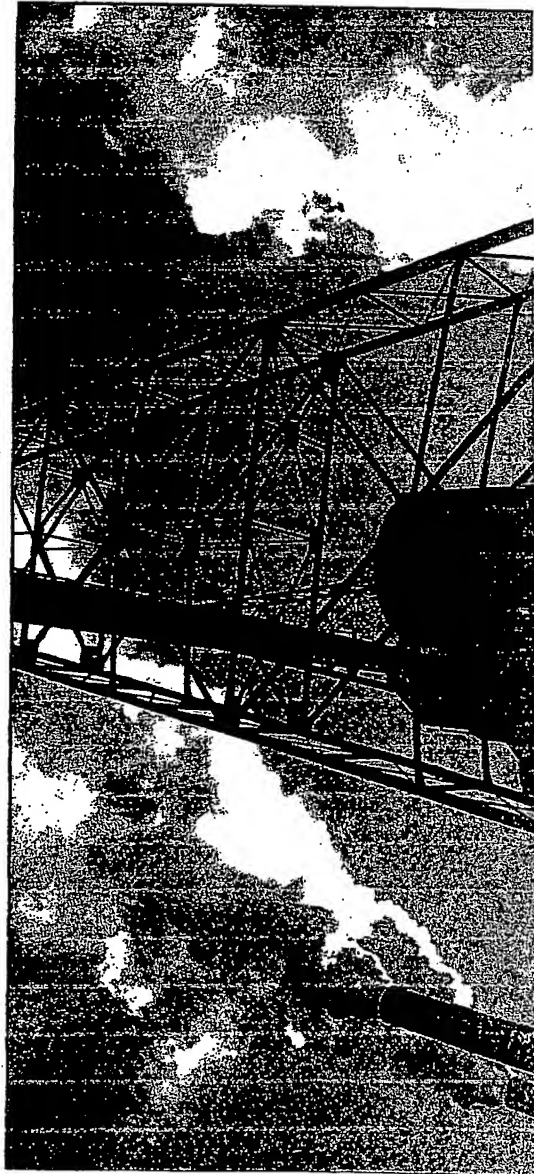
WASHINGTON — Federal environmental officials and the U.S. Justice Department filed a lawsuit Jan. 28 accusing a Kentucky electric utility of violating the Clean Air Act's New Source Review provisions by modifying coal-fired power plants without obtaining the proper permits.

This is the first New Source Review case filed by the Bush administration that appears headed to trial. In four other cases, the federal government filed complaints, but at the same time filed negotiate settlements.

A settlement appears unlikely in this case, Justice officials said.

"No, certainly East Kentucky was aware of our actions before yesterday — now it will come before the court," department spokesman

See Bush, Page 2



SOFTWARE SOLUTIONS
FOR THE WASTE INDUSTRY

Products and Services

WWW.TRANSCOVP.COM
877.546.7550



TRANS COMP



Our Mission

To be the leading software, hardware and consulting services provider to the waste industry.

To develop software using leading technology that offers all the system features needed to support the diverse needs of the waste industry.

To develop hardware solutions using leading technology. These solutions will be reliable, cost effective and able to withstand the needs of the waste industry.

To provide consulting services that are insightful, cost effective and achieve our clients' desired results.

Our clients will consider us an integral contributor to their success.

Our clients' continued success is our ultimate goal.

To Schedule a demo call 877-546-7550

Software Solutions for the Waste Industry

About TransComp Systems ▶

From our inception, TransComp Systems has concentrated on providing Waste and Recycling companies with integrated, end-to-end, Microsoft based business solutions. Our goal is to help companies increase their profitability by providing streamlined operational business processes, more efficient billing and customer service, flexible reporting capabilities and route profit analysis. TransComp Systems' services encompass software installation and integration, customization, consulting, customer support and education.

Our flagship software application, **Tower 5.0**, is the only product of it's kind that offers haulers a Microsoft Windows based billing and routing system that is integrated to Microsoft Great Plains accounting software. Our Microsoft-driven technology is aimed at increasing your bottom line through seamless integration to "best of breed" applications that we offer, including GPS (Global Satellite Positioning), GIS (Digital Mapping), Print and Mail services, automatic check deposit and much more.

Best of all, TransComp Systems offers Internet hosting services to companies who wish to utilize the power of the Tower software, but do not want to install the software on their local network. For smaller operations, our hosted services will allow you to operate the Tower software for a nominal monthly fee. This means that whether you are big or small, we have the solution that will fit your budget.

The staff at TransComp Systems has several years experience working in the waste management industry. We understand that in order for technology to be effective, it must be simple, stable and user friendly. Above all, technology must improve the quality of the lives of those who are affected by it. At TransComp Systems, we make it our business to understand your business. Whether you are an industry "Big Six", a regional leader or a small start-up, TransComp Systems has the solutions that will help you meet your business goals.

Experience ▶

Our personnel has implemented or supervised the implementation of hundreds of software systems since 1980. We enjoy an excellent relationship with Microsoft Great Plains Software on several levels. We have been directly involved in over 50 successful installations of the Microsoft Great Plains Solomon IV for Windows accounting software product.

TransComp's programmers have written Microsoft Windows-based business software applications since 1987, and client-server accounting solutions since 1989. Specific software development and product development expertise includes:

Microsoft Windows
Client-Server Software
Internet Information Server
Windows NT 3.51 - 4.0, 9x, Me, 2000, XP
Arcview/Avenue
Java/J++, ASP
XML, HTML, DHTML and .NET
FRx Financial Reports

Microsoft SQL Server
Solomon IV Accounting Software
Pervasive Scalable SQL
Sybase SQL Server
MFC, ANSI C, C++
Visual Basic
Seagate Crystal Reports

Products

TransComp Systems' products suite is designed to provide you with the leading software and hardware solutions needed to compete in today's business environment.

Tower 5.0

▶ Refer to pages 9-26 for more details

Tower 5.0 software is specifically designed for the solid waste and recycling industry. Tower software provides these industries with an integrated, customizable operations management software system designed to enhance productivity and increase profitability through integration and efficient use of today's technology.

Tower's seamless integration of the three main operational components of a hauling company - Billing, Accounting and Routing - provides Tower's customers with reporting capabilities that are unmatched in the industry.

Tower's underlying Microsoft technology provides core stability in today's Windows-based office.

Tower 5.0 software integrates all of the waste management business functions while providing security, audit trails and data integrity. **Tower 5.0** is also fully integrated to the Solomon IV for Windows Accounting Information System and offers all of the benefits of SQL and client/server computing.

Tower 5.0		x
Modules		
Customer Service	▶	
Operations	▶	
Billing and Collections	▶	
Accounting	▶	
Sales Management	▶	
Mapping	▶	
Inventory	▶	
Vehicle Maintenance	▶	
Reports and Analysis	▶	
Website	▶	

eTower

▶ Refer to pages 27-28 for more details

Once again Transcomp will be the first company to offer a web site linked to its software.

The perfect companion to **Tower 5.0**. **eTower** works 24/7, allowing your customers to conveniently access their accounts online, place orders, view and pay their invoices, view their scheduled services, send messages and much more. **eTower** lets your clients help themselves. This reduces the number of customer service calls while improving service; both of which, will reduce your operating expenses.

eTower		x
Features		
24/7 account access	▶	
View invoices	▶	
Pay invoices	▶	
View Services	▶	
Place Orders	▶	
Provide Feedback	▶	

To Schedule a demo call 877-546-7550

Software Solutions for the Waste Industry

Tower Track

Finally! Introducing a GPS vehicle tracking and location system that is tailored to the needs of solid waste management. TransComp Systems has been keeping a close eye on GPS functionality for the solid waste industry for several years. In the past, there have been no "cost-effective" GPS products available that address the specific needs of the waste and recycling industry, and adhere to TransComp Systems' high level of quality, flexibility and functionality.

Managers of solid waste and recycling companies need a product that is easy to use, easy to maintain and delivers information that is important to their operations management.

We are now offering a highly dependable and cost-effective GPS solution that is tailored to the solid waste and recycling industry.

Here are just a few ways our GPS services will improve your bottom line:

- Instantly view the location of your vehicles in REAL-TIME
- Eliminate overtime padding
- Eliminate side jobs
- Eliminate unauthorized stops/breaks and vehicle usage
- Improve route productivity
- Increase productivity

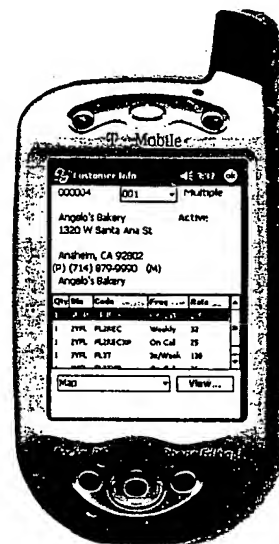
Mobile Tower

Refer to pages 29-30 for more details

Another perfect companion to **Tower 5.0**. Perfect for users who wish to take the power of **Tower 5.0** on the road.

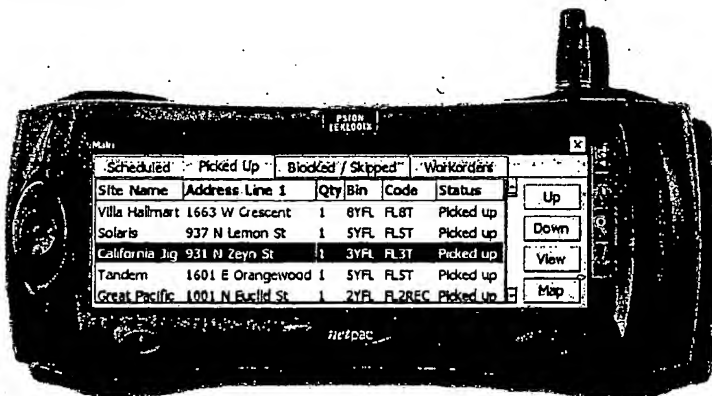
Sales Provide your sales personnel with access to customer and prospect information while out of the office. Increase sales performance by reducing their time at the office and increase face to face with prospects and customers.

Vehicles Eliminate route books and workorders. Provide your drivers with electronic routebooks, real time updates, service location map, and capture service times and incidences.



Sales

Vehicles



Services

TransComp Systems' services compliment our products and are designed to guarantee successful implementation.

Implementation ▶

The primary role of TransComp Systems' Implementation Services is to support the installation and use of TransComp Systems' Tower software. We offer expertise based on our in-depth waste industry knowledge, our customer's key business processes and the Tower software client/server-computing environment.

Implementation Services are offered by TransComp Systems to help ensure that a quality software solution is implemented and that our customers obtain a good working knowledge of the Tower software system. In addition, these services help clients avoid pitfalls, delays and overhead expenses associated with data conversion and data validation. Software installation, training, and integrating Tower to other third party software systems are all part of our Implementation Services.

Our dedicated staff is experienced in requirements analysis, project management, system customization and implementation. Each of the following methodologies are geared toward achieving a successful project implementation and ensuring a long-term customer relationship.

- Understanding the client's business environment
- Understanding the client's analysis objectives
- Educating the client on **Tower 5.0** operations management technology
- Defining and documenting project objectives
- Documenting customization requirements
- Creating an efficient solution model
- Building the right team of TransComp and client personnel
- Assisting the client in implementation preparations
- Training client personnel with self sufficiency as a goal
- Jointly evaluating project success

Data Conversion ▶

TransComp Systems' experienced professionals will provide you with all the necessary tools and assistance needed to convert your existing data into **Tower 5.0** software. Tower professionals have the knowledge to convert data from virtually any other software package including: Soft-Pak, Desert Micro, WAM, Trashflow, Delta, Pros, RICS, RDS and RAMsPRO.

Network Infrastructure ▶

Our experienced installation specialists work with you to build a solid network infrastructure that will support your new **Tower 5.0** system. Prior to the software installation, our network specialists will review your operating environment to ensure that it is set up for optimum performance of your Tower software.



To Schedule a demo call 877-546-7550

Software Solutions for the Waste Industry

Customization

TransComp Systems' **Tower 5.0** is entirely user configurable through the use of the Customization Manager Module and setup files which allow the user to define most aspects of the program's behavior, as well as its "look and feel". For certain customers who require additional program functionality to meet the needs of special business requirements or a business niche, TransComp Systems can provide custom programming and consulting, creating the most efficient solution to any requirement.

In today's competitive business environment, it is vital that your software systems not just work, but that they work together to provide your business with the maximum efficiency possible. At TransComp Systems we have gone to great lengths to make the **Tower 5.0** System as integrated as possible with other waste industry "best of breed" software solutions.

As with any system, there will always be new software products and hardware devices that have yet to be integrated with or connected to the Tower System. As part of the service that we offer to our customers, we use our expertise to continuously integrate the **Tower 5.0** System with whatever software and hardware systems that are, or might become, essential to your business.

Application Hosting

If desired, TransComp Systems can host your Tower software for you. Join the growing list of haulers who are utilizing our "Hosted Services" and take advantage of the power of Tower's software for your company's billing, accounting and operational requirements. All you need is Internet connectivity. Here are just a few of the benefits:

- Eliminate the need to purchase a server
- Eliminate network administrative expenses
- Eliminate the need to purchase a backup system
- Eliminate on-site implementation fees
- Eliminate the need to purchase the Tower software applications
- Eliminate the need for expensive computer consultants
- Connect to your data anywhere, anytime
- Train over the Internet
- Eliminate "computer headaches"

TransComp Systems' Hosted Service is especially cost effective for smaller companies. After all, small companies have the same operational requirements as larger companies, just fewer customers to service. Whether your plans are to remain on a smaller scale or you have aspirations to be a regional industry leader, Tower software can help you increase your competitive advantage. Our Hosted Services will keep you out of the computer business and help keep your staff focused on servicing your customers.

Technology Advantage

Microsoft
CERTIFIED

Partner

Leading Technology ▶

TransComp Systems set the bar with our introduction of the Tower 2001 software to the hauling market in 1997. Tower 2001 was the first software system to be offered to haulers that was built using Microsoft Windows Technology. Today, **Tower 5.0** continues to set the bar with its features, functionality and stability.

Tower 5.0 remains the only fully-integrated software designed for the hauling industry that utilizes Microsoft technology "from the ground up". Don't be fooled by companies that claim to have "total Windows functionality". These are typically DOS or AS-400 based products with a "Windows" front end.

Most of these other products do not even run on Microsoft's database engine. If it is not built with Microsoft tools and running on Microsoft's database engine, it is not a *true* Microsoft Windows product! If you are like most businesses in the U.S., you have already standardized on Microsoft technology. Your workstations are running in a Microsoft operating environment (NT or Windows 2000) and you have standardized your office software to Microsoft Office.

For total stability, flexibility, and integration throughout your entire enterprise, **Tower 5.0** should be your product of choice for your operations, billing, and accounting software.

Effortless Customization ▶

Yet another feature that separates **Tower 5.0** from competitive products is our powerful Customization Manager module. The Customization Manager module allows end users to implement their own customizations.

Add new fields (every screen in **Tower 5.0** and Solomon ships with 8 undefined user fields), change field label names, change tab orders, change field attributes (i.e. invisible, read-only, required, etc.) and much more. Customization Manager allows for customizations to be defined per user, per group or system-wide. No other software product on the market offers you the flexibility and customization capabilities found within **Tower 5.0**.



To Schedule a demo call 877-546-7550

Software Solutions for the Waste Industry

Seamless Integration

Tower 5.0 is the only software system for the hauling industry that seamlessly integrates the three main functions of a hauling business: Billing, Routing, and Accounting.

Tower 5.0 remains the only software available to haulers that is integrated to a financial accounting package – Microsoft Great Plain's Solomon for Windows. No other software offers true, seamless integration to a top-notch financial software package at the General Ledger level.

The best "integration" any of our competitors offer is a data export/import process that creates a summary AR entry. At TransComp Systems, we do not consider a data export/import process to be integrated technology. Tower is the only system that provides routing, billing and accounting functionality on the same integrated database. When a customer record is updated in Tower, it is updated in the accounting as well.

Set up your routes to be tracked in the General Ledger for true route revenue and profitability. Integrate your service codes to General Ledger Revenue Sub-accounts for detailed General Ledger revenue reports with drill-down capabilities. The seamless integration of **Tower 5.0** to Solomon Accounting provides financial, billing and productivity reporting capabilities that are unmatched in the hauling industry.

Waste Industry Experience

The knowledge of our staff has been developed through extensive, hands-on experience in the waste industry. This industry familiarity has been, and will continue to be what distinguishes us from the competition. We understand how your business works and strive to be a important element in your continued success.

Excellent Service

TransComp Systems' dedication to uncompromised customer service began at it's inception. Today, our friendly, knowledgeable staff continues this dedication with the assurance of a quick response and more importantly, a solution to all your technology needs.

Passion for Perfection

TransComp Systems is committed to providing you with a full featured software solution. Through consistant project monitoring and customer feedback, we continuously update our systems' features to meet the ever-changing needs of technology.

Customer Service

Tower's Customer Service screen is easy to learn and is meant to provide CSR's with a "snap-shot" of information about the customer. CSRs can view current services, service history, billing history, routing, container, "next invoice", and AR information. In addition, they can edit customer and/or site information, add notes, and add, update or cancel services.

The customer service screen is the starting point for viewing customer information.

Buttons allow users to quickly access an array of information, including contact information, current services and balances due.

***Customer Service (RW.C20.00)**

Customer		Service Order		Site Notes															
Customer ID	ANC000002	Old Acct		Site ID	001 (Multiple) Status Active Pickup														
Name	Robert's Engineering			Address Line 1	2230 W Colchester Dr														
Company ID		Class ID	COM	Address Line 2															
		Status	Active	City, State, Zip	Anaheim CA 92804														
				Phone	(714) 739-3766 Mobile ()														
<table border="1"> <thead> <tr> <th>Cycle</th> <th>Current</th> <th>30 Days</th> <th>60 Days</th> <th>90 Days</th> <th>Over 90</th> <th>Total Due</th> </tr> </thead> <tbody> <tr> <td>C</td> <td>154.00</td> <td>1172.58</td> <td>0.00</td> <td>0.00</td> <td>0.00</td> <td>1279.58</td> </tr> </tbody> </table>						Cycle	Current	30 Days	60 Days	90 Days	Over 90	Total Due	C	154.00	1172.58	0.00	0.00	0.00	1279.58
Cycle	Current	30 Days	60 Days	90 Days	Over 90	Total Due													
C	154.00	1172.58	0.00	0.00	0.00	1279.58													
New Customer...		Edit Customer...		Edit Sites...															
Qty	Svc Code	Freq	Rate	Mon	Tue	Wed	Thu	Fri	Sat	Sun	OC	Week	Sharing						
1.000	ACR1CY	Weekly	32.00			R1													
1.000	ACR2CY	Weekly	15.00			R1													
1.000	ACT1CY	3x/Week	107.00	C1			C1		C1										
1.000	AR200C	On Call	380.00									400							
Total Recurring Charges 154.00																			
<div> <div>Calendar</div> <div>Next Invoice</div> <div>A/R</div> <div>Billing</div> <div>Containers</div> <div>Map</div> <div>Contract</div> </div>																			
0000 SYSADMIN 5/12/2002																			

Quickly calculate the next invoice.

***Estimated Invoice (RW.C10.00)**

Site Id	Description	Service Code	Start Date	End Date	Freq	Qty	Rate	Charge	Tax
001	Anaheim Commercial Trash 1 Cub	ACT1CY	6/1/2002		3x/Week	1.00	107.00	107.00	0.00
001	Anaheim Commercial Recycle 2 C	ACR2CY	6/1/2002		Weekly	1.00	15.00	15.00	0.00
001	Anaheim Commercial Recycle 1 C	ACR1CY	6/1/2002		Weekly	1.00	32.00	32.00	0.00
								Charge	154.00
								Tax Amount	0.00
								Total	154.00
0000 SYSADMIN 5/12/2002									

***Calendar (RW.C32.00)**

Customer ID: ANC000002 Robert's Engineering
Site ID: 001 Robert's Engineering

MAY 2002

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Materials:
T - Trash
R - Recycle
Y - Yard Waste
M - Medical
S - Service
O - Other
X - Mixed

Status:
Scheduled
Picked Up
Blocked/Skipped
One Time/Extra

Qty	Svc Code	Description	Status	Reason
1.00	ACT1CY	Anaheim Commercial Trash 1 Cubic Yard	Blocked	Red Toyota

0000 SYSADMIN 5/12/2002

The Calendar screen provides a historical view of services provided including blocked or skipped stops documented by operations.

To Schedule a demo call 877-546-7550

Software Solutions for the Waste Industry

***Customer Service (RW.C20.00)**

Customer ID: ANC000012 - Progressive Die & Stamping Co S/O: 001 - Progressive Die & Stamping Co

Type: Note:

New
Save
Delete

Type	Date	Time	User	Note
CREDIT	5/12/2002	09:03	SYSADMIN	Credit Request
COMPLAINT	5/12/2002	08:57	SYSADMIN	Complaint about trash left in the street
COMPLAINT	3/10/2002	08:58	SYSADMIN	Complaint about trash left in the street - Driver did not close enclosure doors

Calendar Next Invoice A/R Billing Containers Map Contact

0000 SYSADMIN 5/12/2002

Contact History

Easily access your client contact history. Create your own note types. **Tower 5.0** automatically captures the user and time.

***Customer Activity (RW.A03.00)**

Customer: ANC000002 Robert's Engineering All Documents Only Open Documents

Aging: Current 30 Days 60 Days 90 Days Over 90 Total Due

154.00 1172.58 0.00 0.00 0.00 1279.58

Type	Statement ID	AR Batch	AR Ref Number	Tran Date	Period Posted	Charges	Payments	Adjustments	Balance
Credit Memo		000095	006911	5/12/2002	01-2000	0.00	0.00	-32.00	1279.58
Credit Memo		000095	006910	5/12/2002	01-2000	0.00	0.00	-15.00	1311.58
Invoice	0000006193	000091	006579	5/1/2002	05-2002	154.00	0.00	0.00	1326.58
Payment	0000005136	000073	12347	4/16/2002	12-1999	0.00	500.00	0.00	1172.58
Payment	0000005136	000072	123456	4/15/2002	12-1999	0.00	532.40	0.00	1672.58
Invoice	0000005844	000082	006238	4/1/2002	04-2002	1565.58	0.00	0.00	2204.98
Payment	0000004736	000054	14879	2/26/2002	12-1999	0.00	1224.48	0.00	639.40
Invoice	0000005136	000075	005550	2/1/2001	02-2001	107.00	0.00	0.00	1863.88
Invoice	0000004736	000064	005194	1/1/2001	01-2001	107.00	0.00	0.00	1756.88
Invoice	0000003986	000050	004575	12/1/2000	12-2000	321.00	0.00	0.00	1649.88
Invoice	0000002916	000043	003539	10/1/2000	09-2000	104.50	0.00	0.00	1328.88
Invoice	0000002554	000039	003189	9/1/2000	08-2000	104.50	0.00	0.00	1224.38

View Statement View Transactions Request Credit Charges Payments Adjustments Balance

Print Statement Print Transactions 4311.90 2985.32 -47.00 1279.58

0000 SYSADMIN 5/12/2002

A/R History

Easily view invoices, payments, credit memos, debit memos and running balance.

View, Reprint, Fax or E-mail an exact replica of invoices.

Tower 2004 Demo

1339 N. 9th Ave
Orange, CA 92667
(714) 255-0116

Customer of 2004
ANC000002
Invoice Date
5/12/2002
Statement #
0020000191

Balance Forward	Payments	New Charges	New Balance
\$ 1,172.58	\$ 2.00	\$ 124.00	\$ 1,374.58

Customer Name: Robert's Engineering

Date	Qty	Frequency	Description	Amount
05/01/02	1.00	1x / Week	Anaheim Commercial Trash 1 Cubic Yrd	35.67
05/01/02	1.00	1x / Week	Anaheim Commercial Recycle 1 Cubic Yrd	35.67
05/01/02	1.00	1x / Week	Anaheim Commercial Recycle 2 Cubic Yrd	0.00
05/01/02	1.00	1x / Week	Anaheim Commercial Recycle 1 Cubic Yrd	0.00

***Request Credit (RW.A06.00)**

Customer: ANC000002 Robert's Engineering

AR Ref Nbr: 006579

Tran Date	Amount	Description	Credit Reason	Credit Amount
5/1/2002	35.67	Anaheim Commercial Trash 1 Cub	VACANCY	35.67
5/1/2002	35.67	Anaheim Commercial Trash 1 Cub	VACANCY	35.67
5/1/2002	35.66	Anaheim Commercial Trash 1 Cub		0.00
5/1/2002	15.00	Anaheim Commercial Recycle 2 C		0.00
5/1/2002	32.00	Anaheim Commercial Recycle 1 C		0.00

Credit Description
Property was vacant on May 2002

Submit Request

0000 SYSADMIN 5/12/2002

Customer Service

The Tower 5.0 Customer Service module is feature-rich and easy to learn. Use the Tower 5.0 Customer Service module to manage customer accounts more effectively and productively.

Service Contract Detail (RW.C17.00)

Contract ID: 0000000012 Customer: ANCO00002 Robert's Engineering

Contract		Quotes	Recurring	One Time
Svc Code	Description	Qty	Bin Size	Svc Freq
001 ACT1CY	Anaheim Commercial Trash 1 Cubic Yard	1.00	01Y	3x/Week
001 ACR1CY	Anaheim Commercial Recycle 1 Cubic Yard	1.00	01Y	Weekly

Contract Start Date: 5/1/2002 Terms: 36 Status: Signed Sales Representative: LUISA

Contract Notes: No price increase for one year.

Roll Over

Standard Contract

Print Contract

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Contract Management

Create service contracts, assign contract expiration, contract roll over capability and track the status of the contract.

Easily monitor contracts that will expire in the future.

***Customer Service (RW.C20.00)**

Customer ID: ANR000352 - David Navarro Site: 001 - David Navarro

Show Orders: This Customer Do Not Create Workflow

Service Order: Release Order

Order Status: Unreleased

Call Type: New Service Order Date: 5/12/2002 Cust PO:

Service Code	Qty	Cont ID	Freq	Week	Start Date	End Date	Rtn Code	Mon Rte	Tue Rte	Wed Rte	Thu Rte	Fri Rte	Sat Rte	Sun Rte	QC Rte	Dvd Prc	Price	Ta
ARR14G	1.000		Weekly	N/A	5/6/2002						RR1						4.68	0.
ART90G	1.000		Weekly	N/A	5/6/2002						RT1						17.16	0.

Scale Ticket Pricing Shared Billing Time Windows

Recurring: 21.84 One-Time: 0.00 Tax: 0.00 Total: 21.84

Calendar Next Invoice A/R Billing Containers Map Contact

0000 SYSADMIN 5/12/2002

Add, Change, and End Services Quickly

Tower 5.0 automatically suggests the schedule for a given service.

Tower 5.0 allows the user to easily override the standard rate.

Easily add special instructions to the service order.

Note (98.261.00) From (RW.C20.00)

Type: SDO Mail Revised Date: 5/12/2002

Place containers on left side of garage

Easily add requested service times for deliveries, removals or service.

***Customer Service Time Windows (RW.C20.00)**

Service Order: 00000000301 Service Code: ART90G

Recurring Time Windows

Start Time 1: 10:00 End Time 1: 12:00

Start Time 2: : End Time 2: :

Container Delivery Time Windows

Start Time 1: 09:00 End Time 1: 12:00

Start Time 2: : End Time 2: :

Container Removal Time Windows

Start Time 1: : End Time 1: :

Start Time 2: : End Time 2: :

OK

0000 SYSADMIN 5/12/2002

To Schedule a demo call 877-546-7550

Software Solutions for the Waste Industry

Customer Service Module - Selected Feature List

Supports unlimited service locations for a single customer
Offers flexible pricing - Tower 5.0 supports standard, override, variable unit, monthly minimums, container rentals and charges over a specified tonnage or days allowed
Offers automated routing - Tower 5.0 automatically suggests the appropriate route to new customers
Offers automatic work orders - As your client services are updated, Tower 5.0 will automatically generate the appropriate work orders to deliver, perform recurring service, exchange or remove containers
Offers completion notification - Customer service is automatically notified when operations completes a work order
Calculates and displays the "Next Invoice" with a click of the mouse
Displays invoice and payment history
Creates paperless credit memos - Replace time consuming and endless paper trails with Tower 5.0 online credit memo processing
Re-applies or reverses payments with an automatic NSF fees option
Displays a service history calendar with recorded blocked or skipped stops
Displays contact history - Easily view customer contact history
Allows you to create and manage service contracts with expiration dates and special terms
Allows you to assign credit limits - Tower will block the release of new orders for customers that have exceeded their credit limit
Supports Customer Statuses - Active, inactive, credit hold and vacation
Displays customers' sales history - Easily view up to 12 month sales history activity
Supports any service frequency - On call, from once weekly to once every 52 weeks
Display service time windows - Easily communicate to operations service time windows for delivery, service and removal of containers
Easily view clients on site container inventory
Accurate prorations - Replace time consuming, error-prone manual approaches to prorations with far more efficient, accurate, automated capabilities of Tower 5.0.

Dispatch

Tower 5.0 handles operations tasks through its unique "paperless workflow" system. This eliminates the need for customer service representatives to write internal work orders. When customer service enters a service order for a customer, all internal work to be completed for customers is pre-defined in workflow setup and sent electronically to the proper department's electronic dispatch board.

***Daily Route Entry (RW.C21.00)**

Date: 5/20/2002 Monday Display Route Type: All Display Material Type: All

Status	Route	Type	Type	Loads	Qty	Truck	Driver	Helper	Route Start	Route End	Lunch Start	Lunch End	Miles	Fuel	
In Progress	C1	COM	Trash	0	97	321	DAND		05:00	:	:	:	0	0	COM COUNTY
In Progress	C2	COM	Trash	0	40	301	DAVID		05:00	:	:	:	0	0	COM CITY
In Progress	RT1	RES	Trash	0	215	314	JAMESH		06:00	:	:	:	0	0	RES TRASH 1
In Progress	RR1	RES	Recycle	0	47	321	PAULG		06:00	:	:	:	0	0	RES REC 1
Scheduled	RY1	RES	Yard	0	224				:	:	:	:	0	0	RES YARD 1
Scheduled	400	TMP	Trash	0	1				:	:	:	:	0	0	Routed Roll Off
Scheduled	106	TMP	Mixed	0	3				:	:	:	:	0	0	DOWNTOWN

Stop Details Resequence Stops Downtime Landfill Print Daily Route Books

0000 SYSADMIN 5/14/2002

Take advantage of Tower's unique automated routing feature. **Tower 5.0** will build a "knowledge database" from your existing routes. This "knowledge database" will recommend which route a new customer should be assigned based on where the new customer is located and which existing route is servicing that area.

***Address Master (RW.C11.00)**

Zip Code: ADRIA Street Name: Route: Day of Week: Material: Sort Order: Street Name/Prefix/Type/HiLow

Load Records Build From Route

Street Prefix	Street Name	Street Type	Zip	# Low	# High	Street Side	Material	Mon Rte	Tue Rte	Wed Rte	Thu Rte	Fri Rte	Sat Rte	Sun Rte	On Call
S	ADRIA	ST	92802	100	1200	Even	Recycle				RR1				
S	ADRIA	ST	92802	100	1200	Odd	Recycle					RR2			
S	ADRIA	ST	92802	100	1200	Both	Trash				RT1				
S	ADRIA	ST	92802	100	1200	Both	Yard Waste				RY1				

0000 SYSADMIN 5/17/2002

To Schedule a demo call 877-546-7550

Software Solutions for the Waste Industry

Use the dispatch boards (commercial bins, residential carts, roll-off or extras) to track the assignment of work orders to routes or drivers.

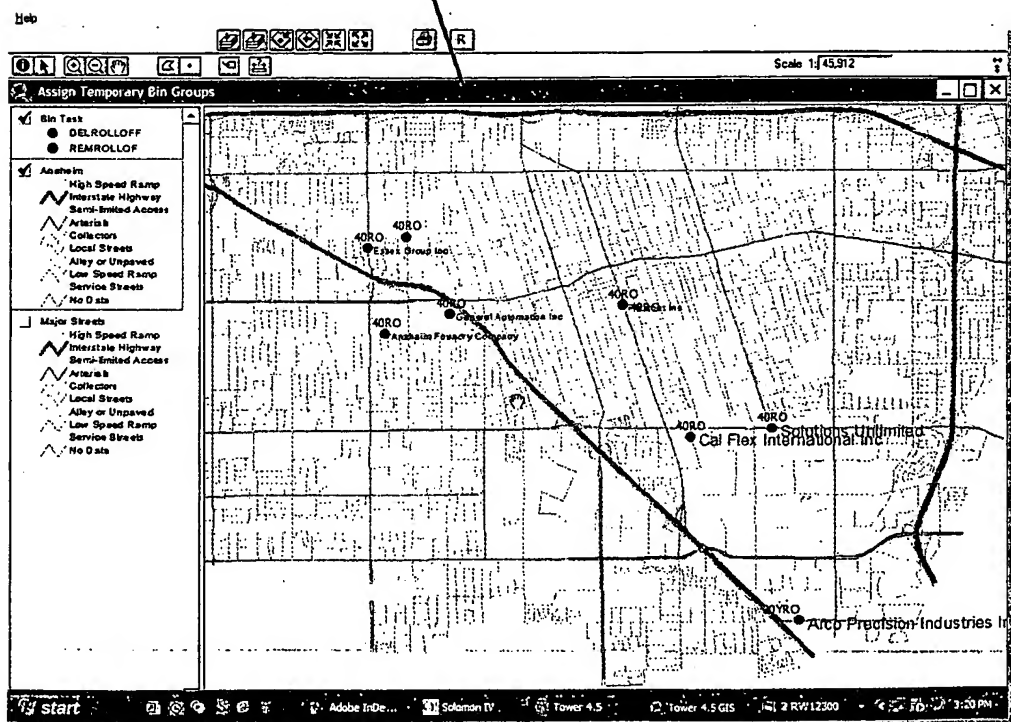
T-Bins Dispatch (RW.123.00)

Filter

Dispatch

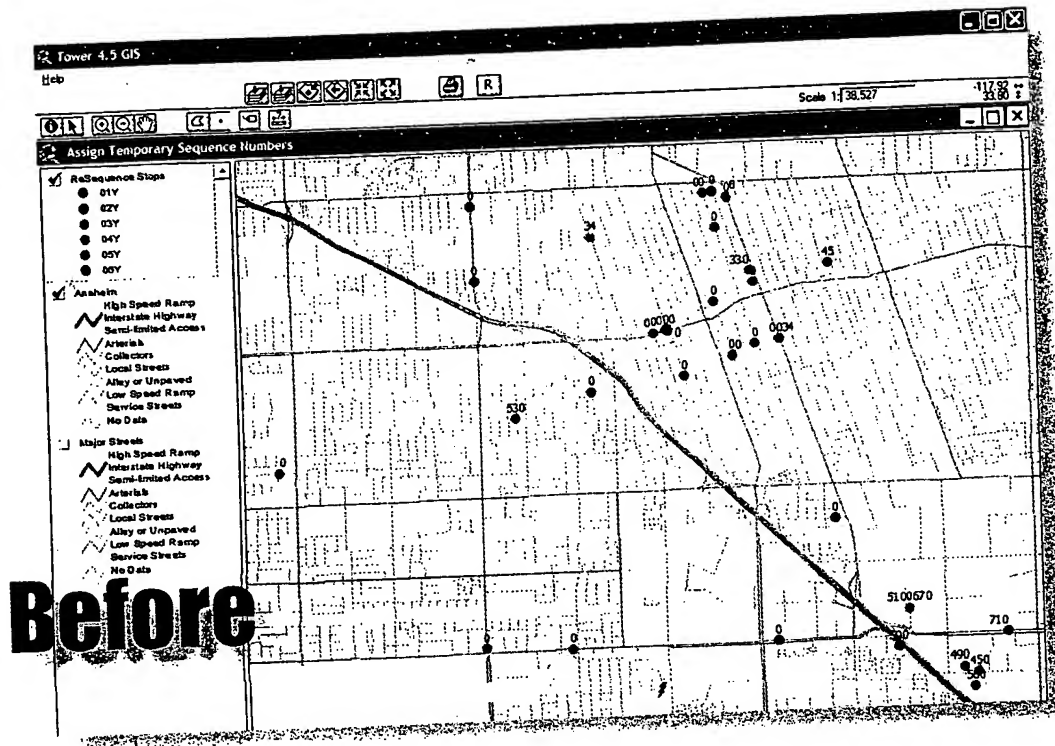
Print WO	Completed	Route	Seq #	Scheduled	Qty	Work Flow	Move Type	Cont ID	Address Line 1	Name
Yes	<input type="checkbox"/>			0 5/12/2002	1	DELROLLOFF	Deliver	40RO	407 S Anaheim Blvd	Plasmet Inc
No	<input type="checkbox"/>			0 5/12/2002	1	REMROLLOFF	Remove	40RO	407 S Anaheim Blvd	Plasmet Inc
No	<input type="checkbox"/>			0 5/12/2002	1	REMROLLOFF	Remove	40RO	2569 W BALL RD	Banner Sign Co
No	<input type="checkbox"/>			0 5/12/2002	1	REMROLLOFF	Remove	40RO	119 S Adams St	General Automation Inc
No	<input type="checkbox"/>			0 5/12/2002	1	DELROLLOFF	Deliver	40RO	1601 W Crescent Ave	Apache Plastics LP
Yes	<input type="checkbox"/>			0 5/12/2002	1	DELROLLOFF	Deliver	20YRD	1535 E Orangewood Ave	Arco Precision Industries Inc
No	<input type="checkbox"/>			0 5/12/2002	1	DELROLLOFF	Deliver	40RO	1652 W Broadway	Anaheim Foundry Company
No	<input type="checkbox"/>			0 5/12/2002	1	DELROLLOFF	Deliver	40RO	1201 E Ball Rd	Solutions Unlimited
No	<input type="checkbox"/>			0 5/12/2002	1	DELROLLOFF	Deliver	40RO	1240 S Claudine St	Cal Flex International Inc
No	<input type="checkbox"/>			0 5/12/2002	1	DELROLLOFF	Deliver	40RO	540 N Euclid St	Essex Group Inc
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Use electronic maps as a tool for dispatching roll-off work orders, container deliveries, and removals. **Tower 5.0** will also allow you to print service location maps on each work order.

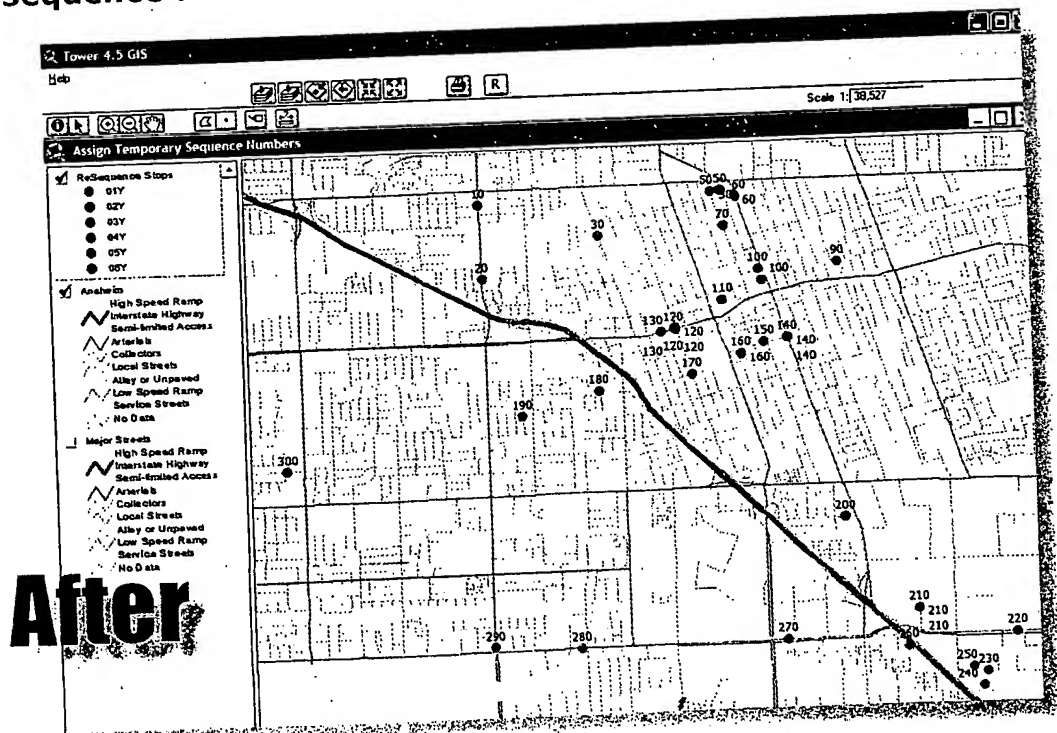


Routing

Tower 5.0 ArcView re-sequencing tool allows you to easily re-sequence a route.



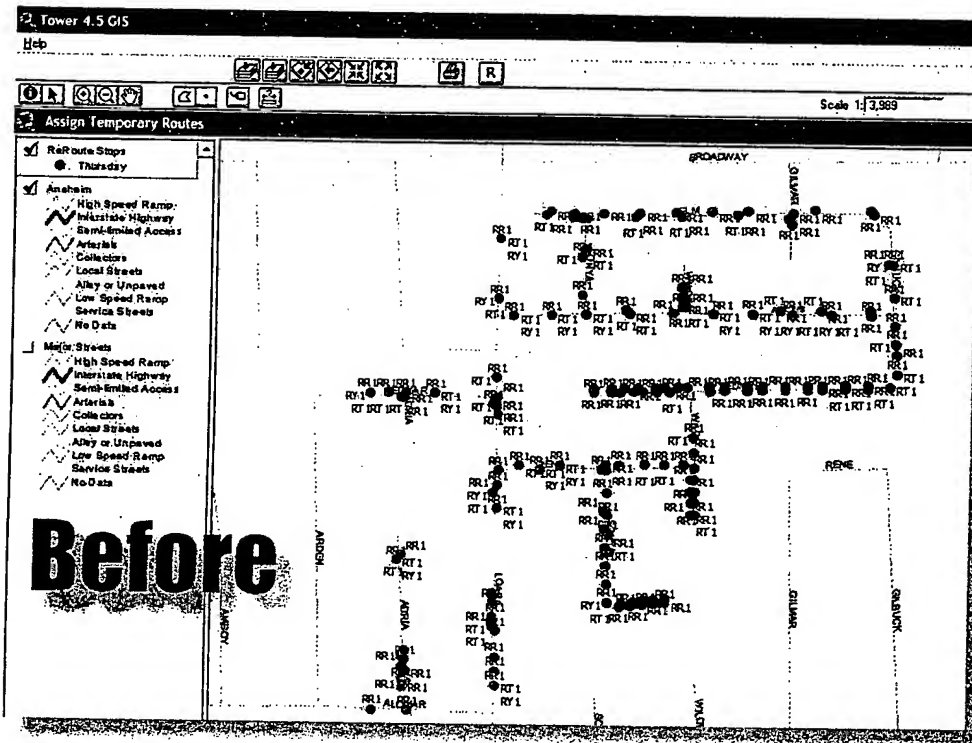
Re-sequence a route in less than 60 seconds. Now *that's* POWER!



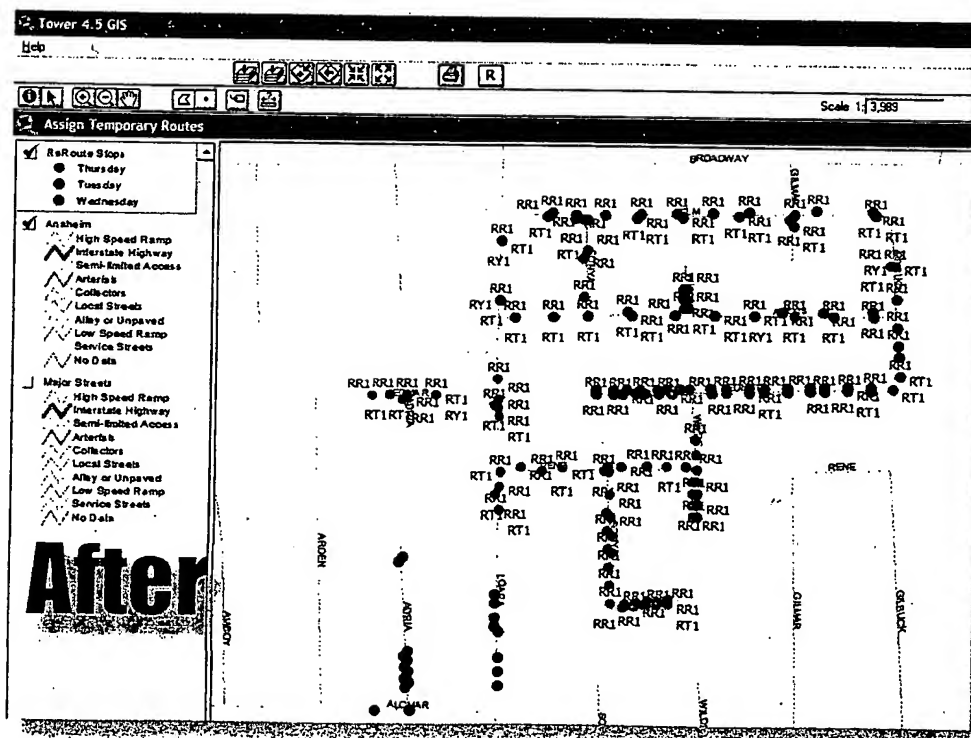
To Schedule a demo call 877-546-7550

Software Solutions for the Waste Industry

Tower 5.0 ArcView rerouting tool is simply the easiest rerouting tool on the market.



Reroute 500 stops in less than 60 seconds. Now *that's* POWER!



Inventory Management

The Tower 5.0 Inventory module is tightly integrated with customer service and operations. As containers are delivered, removed or serviced, Tower 5.0 keeps track of all transactions; thereby maintaining accurate inventory. The Tower 5.0 Inventory module can track any type of inventory including serialized containers.

***Container Inventory (RW.303.00)**

Yard ID: _____ Container ID: 20YRD Serial Nbr: _____ Load Records

Display Inventory: [All Customer and Yards] Sort By: [Container ID/Yard] Max Records: 500

Container ID	Serial Nbr	Qty	Yard ID	Customer ID	Site ID	Site Name
20YRD	ANS20024	1		ANC000046	002	Fornaciari & Sons
20YRD	ANS20011	1		ANC000047	001	Wesval Inc
20YRD	ANS20005	1		ANC000053	002	Designs Extraordinaire
20YRD	ANS20023	1		ANC000055	002	Spicer America Corp
20YRD	ANS20014	1		ANC000080	002	Orange County Ice Inc
20YRD	ANS20001	1		ANC000226	001	General Ceramics/Tekform Prods
20YRD	ANS20006	1	AYARD			
20YRD	ANS20009	1	AYARD			
20YRD	ANS20012	1	AYARD			
20YRD	ANS20013	1	AYARD			
20YRD	ANS20017	1	AYARD			
20YRD	ANS20020	1	AYARD			
20YRD	ANS20021	1	AYARD			

Inventory Adjustment... Move... Properties...

0000 SYSADMIN 5/14/2002

tower 5.0 Container Inventory
Keep track of containers. Find the location of your containers at any time.

Inventory Adjustments

Maintain detailed records of purchase, sales and scrapping of container inventory. **Tower 5.0** inventory management tools allow you to easily maintain a reliable inventory.

Inventory Adjustments (RW.303.01)

Container ID	Adjustment Type	Qty	Yard ID	Serial Nbr	Note
20YRD	[Select Type]	0	AYARD	ANS20006	

Purchase
Sell
Build
Scrap
Increase


Process Adjustments

To Schedule a demo call 877-546-7550

Software Solutions for the Waste Industry


Container Activity

Easily view container inventory transactions for any given period.

<div> <div>Date 5/14/2002 05:14am</div> <div>  <div>Rept R</div> </div> </div>											
Container Moves											
Date	Container ID	Serial #	Qty	Yard	FROM Customer	Site	Yard	TO Customer	Site	Trans Type	Description
5/3/2002	1Y		1	AYARD				ANC000016	001	Yard to Custom w	Anshelm Commercial Recycle 1 C
5/7/2002	1Y		103	AYARD						Reduce at Yard	
5/7/2002	1Y		104		ANC000160	001		ANC000160	001	Customer to Yard	Processed with RW 303.02
5/7/2002	1Y		10	PLYARD						Scrap at Yard	Old containers
5/7/2002	40YRO		100				AYARD			Purchase for Yard	po 344422
5/10/2002	5Y		1	AYARD				ANC000023	001	Yard to Custom w	Anshelm Commercial Recycle 0 C
5/8/2002	2YL		1	AYARD				ANC000002	001	Yard to Custom w	Anshelm Commercial Recycle 2 C
5/7/2002	1Y		1	AYARD				ANC000002	001	Yard to Custom w	Anshelm Commercial Recycle 1 C
5/12/2002	1YR		10				AYARD			Purchase for Yard	
5/12/2002	2YR		20				AYARD			Purchase for Yard	
5/12/2002	1YR		1	AYARD			AYARD			Yard to Custom w	Processed with RW 303.02
5/12/2002	2YR		1	AYARD			AYARD			Yard to Custom w	Processed with RW 303.02

Container Inactivity Reports

Find containers that have not incurred any charges, so that additional rental fees and/or minimum monthly charges may be issued.

<div> <div>Date 5/14/2002 05:16am</div> <div>  <div>Rept RW R33</div> </div> </div>											
Unused Container List											
Containers Not Serviced in Last 30 Days											
Bin ID	Description	Serial No.	Customer	Site	Last Transaction						
20YRO	20 Yard Roll-Off	ANS20002	ANC000004	001	04/01/02 Dump & Return						
20YRO	20 Yard Roll-Off	ANS20013	ANC000016	002	04/01/02 Dump & Return						
20YRO	20 Yard Roll-Off	ANS20025	ANC000021	002	04/07/02 Yard to Customer						
20YRO	20 Yard Roll-Off	ANS20008	ANC000024	002	04/09/02 Dump & Return						
20YRO	20 Yard Roll-Off	ANS20015	ANC000032	002	04/09/02 Dump & Return						
20YRO	20 Yard Roll-Off	ANS20010	ANC000035	002	04/10/02 Dump & Return						
20YRO	20 Yard Roll-Off	ANS20016	ANC000042	002	04/10/02 Dump & Return						
20YRO	20 Yard Roll-Off	ANS20024	ANC000046	002	04/10/02 Yard to Customer						
20YRO	20 Yard Roll-Off	ANS20005	ANC000053	002	04/10/02 Dump & Return						
20YRO	20 Yard Roll-Off	ANS20013	ANC000055	002	04/14/02 Yard to Customer						
40RO	40 Yard Roll-Off	ANS20014	ANC000080	002	04/14/02 Dump & Return						
40RO	40 Cubic Yard Roll-Off	ANS40007	ANC000183	001	04/15/02 Dump & Return						
45COM	45 CY Detachable Compactor	3356899	ANC000001	001	04/15/02 Dump & Return						

Billing and Collections

The Tower 5.0 Billing and Collections module is flexible and powerful. It supports any billing frequency from daily to annual billing. Billing analysis reports provide you with the ability to review the accuracy of your billing before it's mailed allowing you to avoid unnecessary customer callbacks.

Billing with Tower 5.0 is fast and reliable. It produces up to 8,000 invoices an hour and does not interfere with your daily activities. There is no need for your users to log out or wait until the end of the day or weekend to run billing.

Billing (RW.240.00)

From: 5/1/2002 Through: 5/15/2002 ☐ Include Printed

Select	Billing Batch	Billing Cycle	Description	Billing Date	Billing Type	Status	Print/Export Date	Posting Period
<input type="checkbox"/>	0000000077	1	Cycle 1	5/1/2002	Normal	Prepared for Printing		05-2002
<input type="checkbox"/>	0000000072	2	Cycle 2	5/1/2002	Normal	Not Billed		
<input type="checkbox"/>	0000000080	L	Landfill	5/1/2002	Normal	Not Billed		
<input type="checkbox"/>	0000000081	T	Temporary	5/1/2002	Normal	Not Billed		
<input type="checkbox"/>	0000000075	X	Calmet Test	5/1/2002	Normal	Prepared for Printing		05-2002

Processing **Printing** **Additional Billing Date**

New Status:

- ☐ Not Billed
- ☐ Billed
- ☐ Sent to AR
- ☐ Released in AR
- ☒ Prepare for Printing

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The Tower 5.0 Billing module is easy to use. Scheduled billings automatically display on the screen and the screen alerts you as of the status of your billing run.

Tower 5.0 Billing Analysis Reports

The Tower 5.0 Billing module includes several analysis reports that will allow you to easily view your billing results and revenue trends.

BILLING REPORT

Date: 5/16/2002
Page: 1

Run at Period: 05-2002

Acct	Name	Billed on Paid	Charges	Charges Appr. (Total)	Payments	Balance Charge	Tax	Total
ANCO000002	Admiral's Engineering	1,172.58	0.00	0.00	0.00	154.00	0.00	1,326.58
ANCO000003	Admiral's Inc	2,718.48	0.00	141.00	500.00	1,849.48	0.00	4,125.56
ANCO000004	Admiral's Safety	9,927.39	0.00	0.00	0.00	911.20	0.00	10,838.59
ANCO000005	Admiral's Pacific Corporation	633.73	0.00	0.00	0.00	246.00	60.28	940.01
ANCO000006	Admiral's Pacific Corporation	3,358.65	0.00	0.00	3,353.85	182.33	0.00	6,005.47
ANCO000007	Admiral's Pacific Corporation	4,038.47	0.00	0.00	0.00	911.84	0.00	5,597.01
ANCO000008	Admiral's Pacific Corporation	0.00	0.00	0.00	0.00	203.33	0.00	12,850.73
ANCO000009	Admiral's Pacific Corporation	1,331.66	0.00	0.00	0.00	481.59	0.00	10,950.17
ANCO000010	Admiral's Pacific Corporation	12,328.14	0.00	0.00	0.00	396.69	0.00	3,319.16
ANCO000011	Admiral's Pacific Corporation	10,303.43	0.00	0.00	0.00	201.79	0.00	3,348.21
ANCO000012	Admiral's Pacific Corporation	3,110.36	0.00	0.00	0.00	182.33	0.00	2,548.93
ANCO000013	Admiral's Pacific Corporation	3,353.65	0.00	0.00	0.00	0.00	0.00	3,353.65
ANCO000014	Admiral's Pacific Corporation	2,348.93	0.00	0.00	0.00	319.76	0.00	3,372.60
ANCO000015	Admiral's Pacific Corporation	3,353.65	0.00	0.00	0.00	352.33	0.00	3,844.09
ANCO000016	Admiral's Pacific Corporation	4,950.27	0.00	0.00	0.00	182.33	0.00	3,548.21
ANCO000017	Admiral's Pacific Corporation	3,353.65	0.00	0.00	0.00	182.33	0.00	3,548.21
ANCO000018	Admiral's Pacific Corporation	3,353.65	0.00	0.00	0.00	182.33	0.00	3,548.21
ANCO000019	Admiral's Pacific Corporation	3,353.65	0.00	0.00	0.00	182.33	0.00	3,548.21
ANCO000020	Admiral's Pacific Corporation	3,353.65	0.00	0.00	0.00	182.33	0.00	3,548.21
ANCO000021	Admiral's Pacific Corporation	3,353.65	0.00	0.00	0.00	182.33	0.00	3,548.21
ANCO000022	Admiral's Pacific Corporation	3,353.65	0.00	0.00	0.00	182.33	0.00	3,548.21
ANCO000023	Admiral's Pacific Corporation	3,353.65	0.00	0.00	0.00	182.33	0.00	3,548.21
ANCO000024	Admiral's Pacific Corporation	3,353.65	0.00	0.00	0.00	182.33	0.00	3,548.21
ANCO000025	Admiral's Pacific Corporation	3,353.65	0.00	0.00	0.00	182.33	0.00	3,548.21

Software Solutions for the Waste Industry

Interface with Microsoft Word and Outlook

Mail merge past due or collection notices to your customers and create your own letters and e-mails.

20

Vehicle Maintenance

Tower 5.0 offers two versions of the Vehicle Maintenance module. For companies that prefer a simple approach to vehicle maintenance tracking, Tower 5.0 includes a limited feature set. For customers that require more advanced features with in-depth tracking, Tower 5.0 integrates with a full featured vehicle maintenance package from our partners, TMT Software.

Maintain Detailed Vehicle Statistics
Keep accurate records of vehicle purchase information, engine and transmission information, current engine hours and mileage.

Engine and Transmission (RW.308.02)

Engine	Model	Serial #	Arrangement	CPL #
CAT	1993	110378299	6546545646	456465465
Transmission	Serial #			
5646545645	2420035740			

OK

Engine and Transmission (RW.308.02)

Engine	Model	Serial #	Arrangement	CPL #
CAT	1993	110378299	6546545646	456465465
Transmission	Serial #			
5646545645	2420035740			

OK

***Vehicles (RW.308.00)**

Vehicle ID	VEH100		
Description	Front Loader		
Driver	100	Purchase Date	10/10/1993
Yard Location	AYARD	Cost	150000.00
Company	Anaheim Demo Company		
Vehicle Type	Commercial	Material	Trash
Truck		Axle	
VIN Number	A46654S646	Axles	2
License Plate	YA23125	GVW	38000.00
Make Year	1993	Tare Weight	14000.00
Manufacturer	Ford	Capacity	24000.00
Registration	31485	Size	9.00
Model	Truck Model 1		
Engine...		Service...	
Packer and Body		Schedule Maintenance...	
Packer Type	2		
Manufacturer	Packer Manufacturer 1		
Model	Packer Model 2		
		0000	SYSADMIN 5/15/2002

Maintenance Scheduling
Create and maintain scheduled maintenance records.

***Vehicle Scheduled Maintenance (RW.305.00)**

Vehicle ID: VEH100
Description: Front Loader

Copy Schedule: ☐ Copy

Maintenance Type	Finished	Interval Type	Interval	Last Service Date	Last Service Mileage	Hours	Next Service Date
OILCHANGE	<input checked="" type="checkbox"/>	Miles	3000	4/1/2002	87000	38700	5/1/2002 9
INSPECTBRK	<input checked="" type="checkbox"/>	Miles	10000	4/3/2002	81000		5/1/2002 9
GENERAL	<input checked="" type="checkbox"/>	Days	30	4/3/2002	86700		5/3/2002
INSPECTOIL	<input type="checkbox"/>	Hours	300	4/3/2002		38550	5/7/2002
CHP	<input type="checkbox"/>	Days	90	4/3/2002			7/2/2002

Maintenance Detail...

0000 SYSADMIN 5/15/2002

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Software Solutions for the Waste Industry

Vehicle Repairs

Create detailed work order records.

***Vehicle Repairs (RW.306.00)**

Tran ID: 0000000001

Description:

Vehicle ID: VEHI100 Front Loader Status: Released

Begin Date: 4/21/2002 End Date: 4/21/2002 Handling: No Action

Part Number: 2510 Description: Oil Filter

Part Cost: 6.75 Part Company: Valvoline

Tran Date: 4/12/2002 Begin Time: 10:00 End Time: 11:00 Hours: 1.00 Completed: Yes

Work Area:

Location: Left Area: Engine

Work Type: Replace Fluids: Engine Oil

Mechanic Information:

Mechanic ID: 111 First Name: Peter

Employee Type: Internal Last Name: Millikin

0000 SYSADMIN 5/15/2002

Vehicle Repairs Report

Monitor and track of vehicle repair expenses.

Date: Wednesday, May 15, 2002
Time: 07:47PM



Rep: RWX31

Vehicle Repair Transaction Listing

Tran ID	Tran Date	Vehicle ID	Begin Date	End Date	Part Cost	Company	Tran Date	Hours
Location	Part #	Part Description	Area	Fluids	Mechanic ID			
0000000001	2510	Oil Filter	4/21/2002	4/21/2002	6.75	Valvoline	04/21/2002	1.00
Left		Replace	Engine	Engine Oil	111			
0000000002	First Repair Transmission	VEHI100	05/09/2002	05/09/2002	14.50	Ford	01/09/2002	1.21
100	Oil Filter							
Trans	Change	Engine			Not Applicable		147	

Records Printed: 2

Sales Management

Tower 5.0 sales management offers easy to use and powerful tools that you need to manage service contracts, pricing updates, and sales forecasts.

Customer pricing management

Tower 5.0 provides tools to effectively manage your pricing update efforts. Update thousands of customer records in minutes.

Update pricing by a % or a flat amount

Customer Pricing Update (RW.204.00)

Customer ID from: to:
 Service Code:

Billing Cycle: ☒ Calmet Test
 Service Area:
 Charge Type: ☐ Include One-Time Prices
 Sort By:

Update Option: Price Increase Reason: Revenue Effect: 49.06
 Increase/Decrease: 3.00 Price Decrease Reason:

Customer	Site	Name	Service Code	Charge Type	Material	Qty	Freq	Current Rate	Last Change	New Rate	Update?
ANC000005	001	Great Pacific Equipment Co	ACR1CY	Recurring	Recycle	2.00	2x/Week	214.00		220.42	Yes
ANC000005	001	Great Pacific Equipment Co	ACR1CY	Recurring	Recycle	1.00	Weekly	32.00		32.96	Yes
ANC000005	001	Great Pacific Equipment Co	ARY10G	Recurring	Yard Waste	1.00	26 Weeks	15.00		15.45	Yes
ANC000021	001	Jacloy Manufacturing	ACT3CY	Recurring	Trash	1.00	Weekly	189.33	7/1/2000	195.01	Yes
ANC000022	001	Bureau of Engraving	ACT2CY	Recurring	Trash	1.00	Weekly	161.26	7/1/2000	166.10	Yes
ANC000023	001	Kimbursky Bros	ACR6CY	Recurring	Recycle	1.00	Weekly	50.00		51.50	Yes
ANC000023	001	Kimbursky Bros	ACT2CY	Recurring	Trash	1.00	Weekly	161.26	7/1/2000	166.10	Yes
ANC000024	001	R & D Electronic Supply	ACT2CY	Recurring	Trash	1.00	Weekly	161.26	7/1/2000	166.10	Yes
ANC000039	001	Villa Hallmart	ACR6CY	Recurring	Recycle	1.00	Weekly	0.00		0.00	Yes
ANC000039	001	Villa Hallmart	ACT4CY	Recurring	Trash	1.00	2x/Week	400.62		412.64	Yes
ANC000040	001	Quantum Chemical	ACT3CY	Recurring	Trash	1.00	Weekly	189.33	7/1/2000	195.01	Yes
ANR000351	001	Test Customer	ACR3CY	Recurring	Recycle	1.00	Weekly	39.00		40.17	Yes
ANR000351	001	Test Customer	ARR14G	Recurring	Recycle	1.00	Weekly	4.68	1/1/2002	4.68	No
ANR000353	001	Dennise Gooden	ARR14G	Recurring	Recycle	1.00	Weekly	4.68		4.82	Yes
ANR000353	001	Dennise Gooden	ART60G	Recurring	Trash	1.00	Weekly	12.79		13.17	Yes

0000 SYSADMIN 8/7/2002

Easily view the last pricing update by customer

Easily exclude customers from pricing update

To Schedule a demo call 877-546-7550

Software Solutions for the Waste Industry

Service Contracts

Create detailed service contracts

***Service Contract Detail (RW.C17.00)**

Contract ID: 0000000017 Customer: ANC000014 Martin Machine Products

Contract		Quotes	Recurring		One Time		
Site	Svc Code	Description	Qty	Bin Size	Svc Freq	Rate	Add Rate
001	ACT3CY	Anaheim Commercial Trash 3 Cubic Yards	1.00	03Y	3x/Week	511.20	0.00

Description: Roll Over

Contract Start Date: 8/7/2002 Terms: 36 Status: Signed Sales Representative: FRANK

Contract Notes: No price increase until September 2003

Print Contract

0000 SYSADMIN 8/7/2002

Keep accurate records of contract terms: start date, length, sales rep, status and contract commitments.

Contract Management

Protect your revenue base. Tower 5.0 provides you the ability to easily evaluate the status of your current contracts.

Contract Management (RW.C15.00)

Select Contracts Expiring From: 8/7/2002 To: 8/7/2009 Contract Status: [ALL]

Select Contracts with Value From: 0.00 To: 0.00 Sort Order: Expiration Date

Customer Current Billing Total From: 0.00 To: 0.00 % Signed Contracts: 25.00

Customer: Class ID:

Sales Rep: Zip Code:

Load Records...

Contract ID	Cust ID	Name	Contract Value	Current Billing	Expiration Date	Term	Sales Rep	Status
0000000002	ANC000005	Great Pacific Equipment Co	211.00	261.00	10/29/2002	24	MIKE	Signed
0000000003	ANC000005	Great Pacific Equipment Co	211.00	261.00	1/1/2003	24	HOUSE	Roll Over
0000000004	ANC000010	Bresco Machine	189.33	189.33	10/29/2003	12	HOUSE	Signed
0000000006	ANC000001	Arco Precision Industries Inc	1162.99	739.99	11/6/2004	36	DAVE	Mailed
0000000014	ANC000001	Arco Precision Industries Inc	252.33	739.99	12/15/2004	36	DAVE	Roll Over
0000000010	ANC000011	Banner Sign Co	475.59	507.59	2/13/2005	36	HOUSE	Expired
0000000012	ANC000002	Robert's Engineering	139.00	534.00	5/1/2005	36	LUISA	Mailed
0000000013	ANC000365	David Navarro	4.68	4.68	5/15/2005	36	HOUSE	New
0000000016	ANC000364	Paul Gonzalez	32.00	32.00	6/4/2005	36	DAVE	Mailed
0000000017	ANC000014	Martin Machine Products	511.20	511.20	8/7/2005	36	FRANK	Signed

View Contract: [Standard Contract] Print Contract: [Sort by Expiration Date] Contract Expiration Report

0000 SYSADMIN 8/7/2002

Reports

Tower 5.0 includes over 120 reports out of the box.
Create your own reports using the most widely used report writer,
Crystal Reports 8.0.

Tower 5.0

Billed, Not Routed Exception
Billing Comparison
Billing Report
Billing Summary
Bin Yard Listing
Blocks and Skips
Commercial Bins Queue Listing
Commercial Sales Journal
Container Class Listing
Container Inventory Report
Container Listing
Container Move Report
Contract Expiration Report
Customer Aging
Customer Class Listing
Customer Information
Customer Revenue by Service Area
Customer Revenue By Route
Customer Revenue by Billing Cycle
Customer Service Orders
Customer Service Queue Listing
Daily Route Book Extras
Dispatch Queue Listing
Dispatch Sales Journal
Franchise Fee Audit Trail
Landfill Listing
Mailing Labels
New Customers
New Customer - Welcome letter
Note Type Listing
Payment List for Credit Hold
Preview Aging
Price Override by Customer Class Listing
Price Override by Customer Listing
Print Report
Recurring Manifest
Recurring Work Order
Residential Carts Queue Listing
Residential Sales Journal
Roll Off Sales Journal
Route Listing
Routed, Not Billed Exception
Scale Ticket Listing
Service Area Listing
Service Area Message Listing
Service Code Listing
Service Code Revenue
Shared Billing Report
Site Notes Report
Standard Price Listing
Statements
Temporary Bins Queue Listing
Unused Containers Report
Vehicle Downtime Report
Vehicle Listing
Vehicle Maintenance Work order
Vehicle Repairs Listing
Vehicle Service Report
Worker Listing
Workflow Code Listing

General Ledger

Trial Balance
Detail General Ledger
Chart of Accounts
Sub accounts
Account Classes
GL Transactions
Allocation Groups
Ledgers
Budget Distribution
Budget Segment Detail
Budget Version Detail
Out of Balance Exception
GL Batch Register
GL Edit

Accounts Payable

1099 Forms
1099 Preview
Account Distribution
Aged AP
AP Batch Register
AP Edit
AP Transactions
Cash Requirements
Check Preview
Check Reconciliation
Check Register
Checks
Detailed Remittance Advice
Document History
Document Register
Period Sensitive Aged AP
PO Addresses
Recurring Vouchers
Unreleased AP Batches
Unreleased PO Vouchers
Vendor Classes
Vendor History
Vendor Period Trial Balance
Vendor Trial Balance
Vendors

Cash Manager

Bank Reconciliation
Cash Accounts List
Cash Flow Items List
Cash Flow Projection
Cash Manager Batch Register
Cash Transactions History
Check Register
Check/Deposit Reconciliation
Daily Cash Balance
Entry Type List
Float Analysis
PTD Distribution List
PTD Transaction List
Recurring Item List
Unmatched Item List

Accounts Receivable

Account Distribution
Aged AR
AR Batch Register
AR Edit
AR Transactions
Customer Classes
Customer History
Customer Period Trial Balance
Customer Trial Balance
Customers
Document History
Document Register
Invoice/Memo Forms
Payment Applications
Period Sensitive Aged AR
Recurring Invoices
Sales Analysis by Class
Sales Analysis by Customer
Sales Analysis by Salesperson
Sales by Commission
Sales by Customer
Statement Cycles
Statements

Financial Statements

Balance Sheet
Tabular Balance Sheet
Balance Sheet Side by Side
Balance Sheet with Ratios
Cash Flow Statement
Balance Sheet-Consolidated
Balance Sheet and Income Stmt Consolidated
Balance Sheet-Consolidated Side by Side
Income Statement-Consolidated
Consolidated Side by Side Income Statement
Full Year Act-Forecast-Budget in the GL
Full Year Actual-Forecast-Ext WKS
Effective Dating in the Tree
Income Statement as % of Net Sales
Income Statement
Rolling Quarter Income Statement
Side by Side Income Statement
Transaction Detail-Departmental
Variance Analysis to Budget and Last Year
Unit Restriction
Row Linking BS and IS
Variance Analysis to Budget
Trial Balance

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Software Solutions for the Waste Industry

Performance Analysis

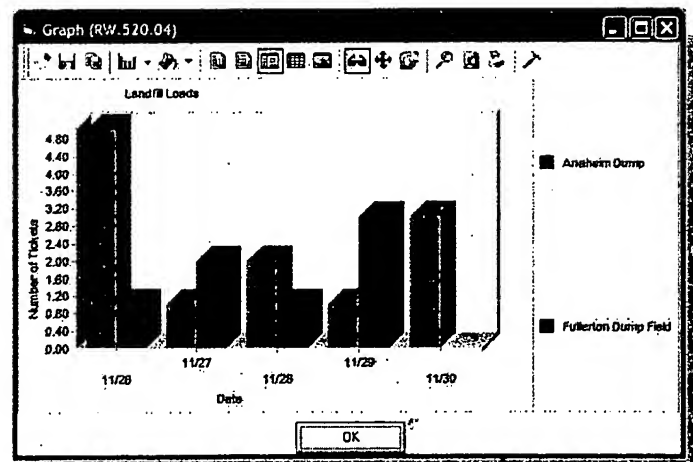
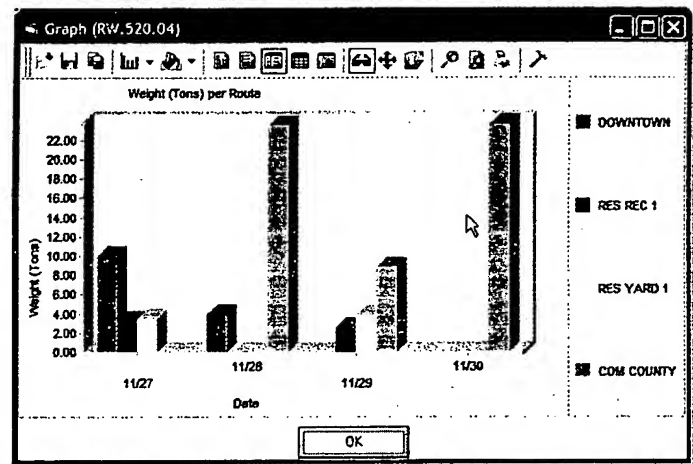
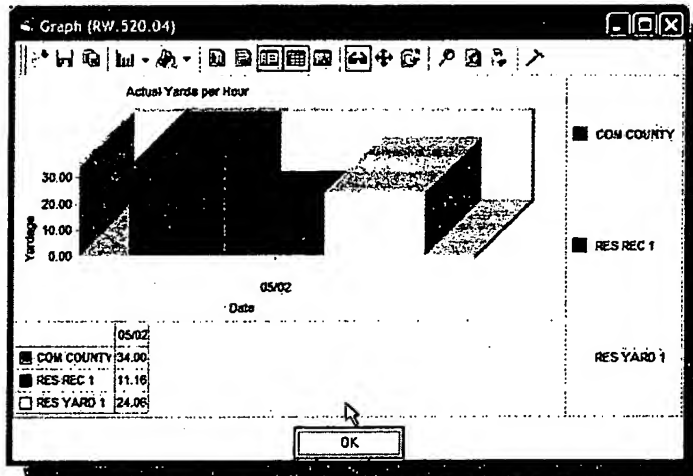
Tower 5.0 is the only software on the market that offers integrated graphical analysis tools.

Create your own graphs and export the graph to Excel, Word or Outlook.

Performance Analysis Graphs

- Actual Stops per Route
- Actual Yards per Hour
- Average Revenue /Container
- Average Revenue Per Working Hour
- Containers by Material/Class
- Containers by Type/Class
- Containers by Type/Svc Area
- Driver Productivity
- Weight (Lbs) / Yardage
- Dump Expense per Landfill
- Landfill Loads by Date
- Landfill Weight (Tons) by Date
- Lifts per Hour
- Productive Hours per Route
- Revenue per Route
- Miles Driven per Route
- Route Productivity
- Dump Expense per Route
- Number of Containers per Route
- Loads per Route
- Weight (Tons) per Route
- Scheduled Containers / Route
- Scheduled Stops per Route
- Scheduled Yardage per Route
- Stops per Hour

Our development staff can also create customized graphs and reports to meet your specific needs.



eTower

eTower is the perfect companion to Tower 5.0. Empower your clients to access their account 24 hours a day 7 days a week while reducing your operating expenses.

Welcome to the eTower Demo - TransComp Systems - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://etower.transcomp.com/mainConsole.asp

Welcome, David Navarro

May 23, 2003

TransComp Hauling

Welcome My Profile View Service History View Invoices Feedback Order Services Order Services Make Payments Print Sign Out

Currently Viewing Active Services for:

000744 - Image Manufacturing - 001 - Image Manufacturing - 1585 E Bell Rd - Go ->

Quantity	Service	Frequency	Rate	Monday Route	Tuesday Route	Wednesday Route	Thursday Route	Friday Route	Saturday Route	Sunday Route	On Call Route
1.00	Front Load 2 Yard Recycle Extra Pick Up	Weekly	\$25.00								
1.00	Front Load 3 Yard Extra Pick Up	Weekly	\$25.00								

REC1 CI

View Current Services

Place orders online

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Address http://etower.transcomp.com/mainConsole.asp

Welcome, David Navarro

May 23, 2003

TransComp Hauling

Welcome My Profile View My Services View Service History View Invoices Feedback

Currently Viewing Active Services for:

000001 - Angelo's Bakery - 001 - Angelo's Bakery - 1320 W Santa Ana St - Go ->

Quantity 1

Service FL2RECOP - Front Load 2 Yard Recycle Extra Pick Up - Rate: \$25.00

Requested By Tom Smith

PO Nbr 90876AB

Date of Service 5/23/2003

Make sure to close the gate. Thank you.

Notes

Submit Service ->

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Welcome, David Navarro

May 23, 2003

TransComp Hauling

Welcome My Profile View My Services View Service History View Invoices Feedback

Currently Viewing Active Services for:

000001 - Angelo's Bakery - 001 - Angelo's Bakery - 1320 W Santa Ana St - Go ->

May 2003

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

1 - FL2T
3 Yard Trash Collection Service
Reason: Red Toyota
Time: 11:32

View service history

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Software Solutions for the Waste Industry

View and print
Invoices

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May 23, 2003

TransComp
Hauling

Welcome My Profile View My Services View Service History Feedback Order Services Make Payments Print Sign Out

Customer ID 000004
Inv. # 0000005026
New Balance \$361.05

Angelo's Bakery
1320 W Santa Ana St
Anaheim, CA 92802

Previous Balance: \$361.05 Pmts/Credits: \$0.00
New Balance: \$361.05

Start Date	Description	Quantity	Amount
2/1/2003	2 Yard Recycling Collection Service	1.00	\$32.00
2/1/2003	3 Yard Trash Collection Service	1.00	\$43.33
2/1/2003	3 Yard Trash Collection Service	1.00	\$43.33
2/1/2003	3 Yard Trash Collection Service	1.00	\$43.34
2/1/2003	State Tax	32.00	\$0.00
2/1/2003	State Tax	43.33	\$0.00
2/1/2003	State Tax	43.33	\$0.00
2/1/2003	State Tax	43.34	\$0.00
2/1/2003	2 Yard Recycling Collection Service	1.00	\$29.33
2/1/2003	2 Yard Recycling Collection Service	1.00	\$29.33
2/1/2003	2 Yard Recycling Collection Service	1.00	\$29.34
2/1/2003	3 Yard Trash Collection Service	1.00	\$44.50
2/1/2003	3 Yard Trash Collection Service	1.00	\$44.50
2/1/2003	State Tax	29.33	\$0.00
2/1/2003	State Tax	29.33	\$0.00
2/1/2003	State Tax	29.34	\$0.00
2/1/2003	State Tax	44.50	\$0.00
2/1/2003	State Tax	44.50	\$0.00

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File Edit View Favorites Tools Help

Address http://etower.transcomp.com/mainConsole.asp

Welcome, David Navarro

May 23, 2003

TransComp
Hauling

Welcome My Profile View My Services View Service History View Invoices Feedback Order Services Print Sign Out

Payments will be posted to:

000004 - Angelo's Bakery - Go >

Customer: 000004
Angelo's Bakery

Apply Payment to Invoice?: 000004755 - Due: 6/30/2003 - Balance Remaining: \$526.64 -

Payment Amount: \$ 526.64

Continue >>>

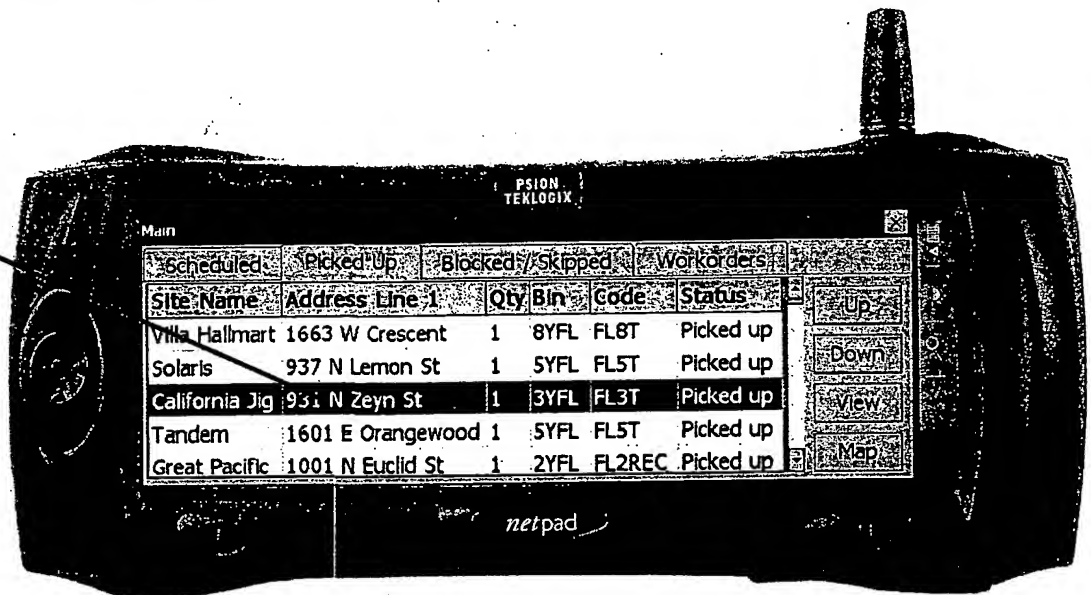
Online Invoice Payments

mobileTower

Vehicles Eliminate route books and workorders. Provide your drivers with electronic routebooks, real time updates, service location map, and capture service times and incidences.

Electronic routesheet

Document service incidences



Stop Details

0 000187 001 California Jig Grinding 1 FL3T 4/21/2003

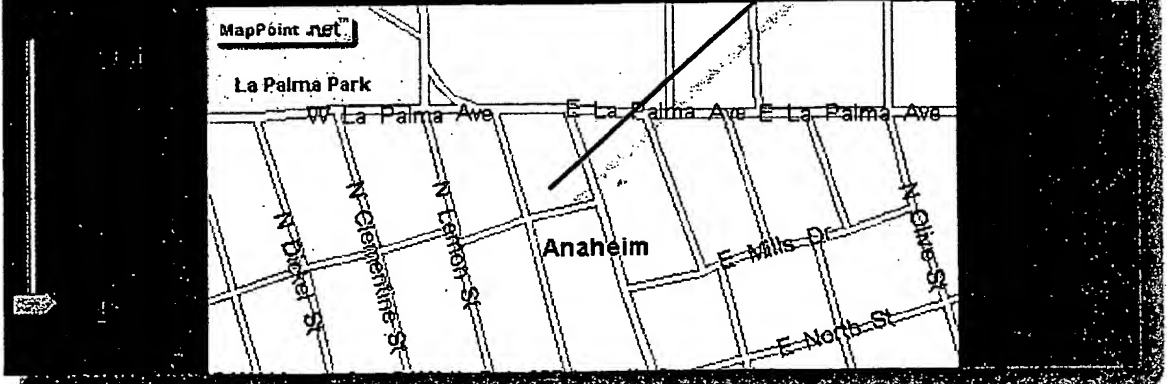
931 N Zeyn St Anaheim CA 92805 (714) 463-3250

Blocked ☒ Blocked by red cougar 1616 1618 600

Save View Map

Locate service location with zoom in and out capability

View Map

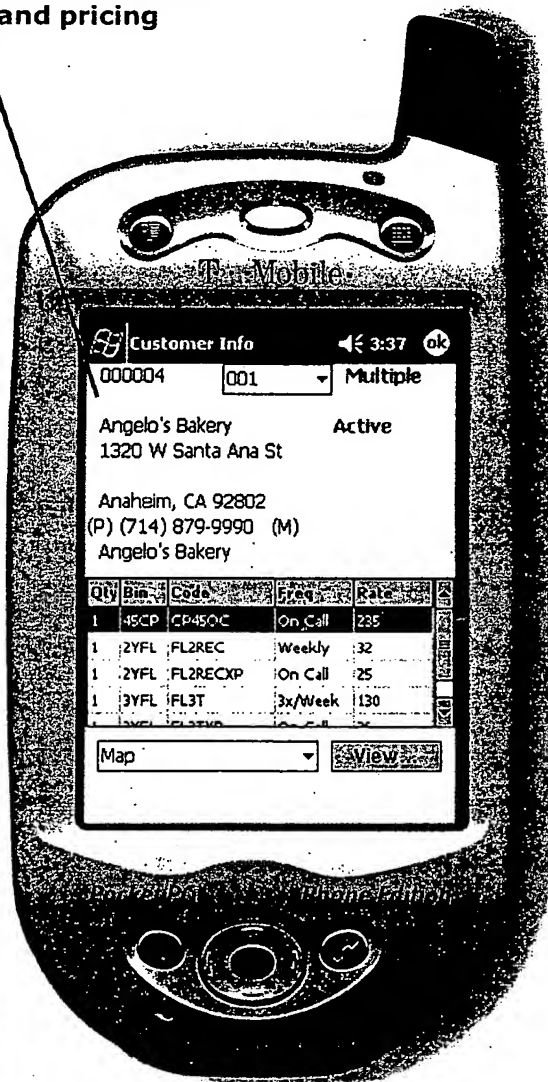


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Software Solutions for the Waste Industry

Sales Provide your sales personnel with access to customer and prospect information while out of the office. Increase sales performance by reducing their time at the office and increase face to face with prospects and customers.

Customer contact information,
active services and pricing

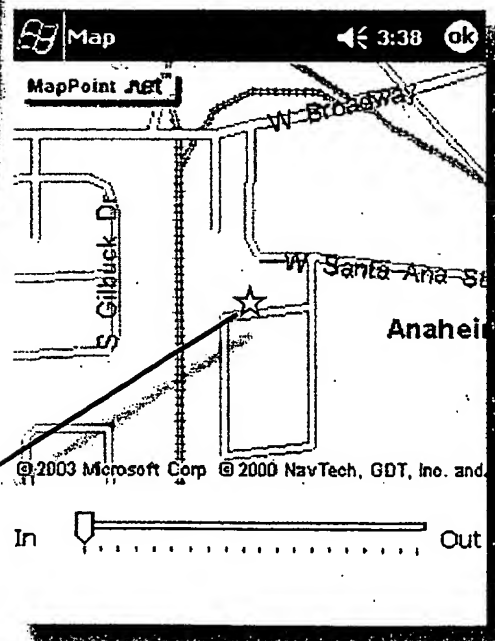


Sales History 3:41 ok

Year: 2003 Load

	Sales	Receipts
Jan	36105	100
Feb	36105	0
Mar	36605	0
Apr	38383	0
May	82864	0
Jun	0	0
Jul	0	0
Aug	0	0
Sep	0	0
Oct	0	0
Nov	0	0
Dec	0	0
13	0	0
Total	13862	100

View sales history



Locate customer or
prospect location
with zoom in and
out capability

For more information about our products and services please go to:

www.transcomp.com

or call us at 877-546-7550





Executive BRIEF

Garbage By The Numbers, An Update on EPA Data

Each year, the U.S. Environmental Protection Agency publishes updated data on municipal solid waste composition, generation, and recycling. This Executive Brief provides a quick profile of the most recent data.

We're not making as much garbage as we used to -- or so the U.S. Environmental Protection Agency (EPA) claims. The steady increase in waste generation over the last four decades has come to an end if recently-released EPA trash numbers are accurate.

According to data from EPA's annual survey of garbage generation, recycling and disposal, Americans generated less trash in 2001 than in 2000. Total tonnage was down by 2.8 million tons and individual waste generation was down by 0.11 pounds a day. See the adjoining chart, "Amount of Waste Generated," for more details.

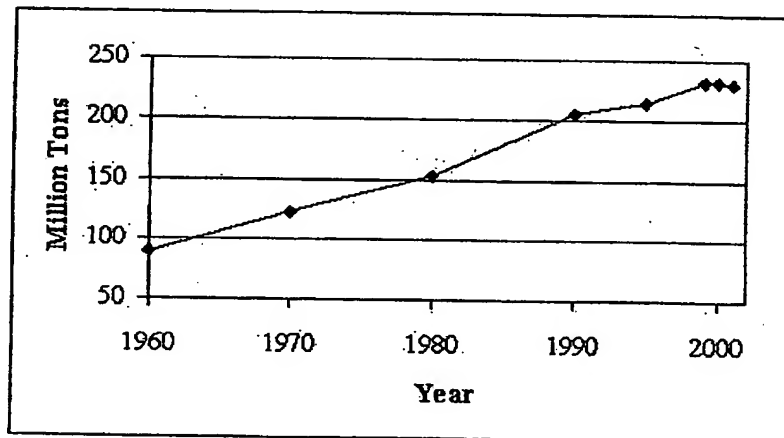
The size of the waste stream is a function of the population and the strength of the economy. A growing population and a growing economy will cause increased garbage production. An economic recession will lead to less garbage as people buy and consume fewer things. Although the population grew in 2001, EPA blames the decline in the waste stream on a weak economy. In particular, EPA references the paper industry in the agency's report, noting a decline in paper production of 5.7 percent in 2001.

Recycling rates continue to increase, with a 2001 recycling rate of 29.7 percent. The 0.4 percent increase from 2000, however, is the smallest in several years. In addition, EPA revised downward the 30 percent recycling rate for the year 2000 that it had announced in its previous report.

The result is that a 30 percent recycling

Amount of Waste Generated

2001 Data	2000 Data
229.2 million tons total volume	232.0 million tons total volume
1,610 lbs/person/year	1,650 lbs/person/year
4.41 lbs/person/day	4.52 lbs/person/day
By weight corrugated boxes, yard trimmings, food waste, newspapers, glass bottles, and wood crates and pallets are the largest items in MSW before recycling. 55 to 65 percent of MSW is generated at home. The remainder at businesses.	



rate appears to be a reasonable target nationally and progress towards a higher rate, such as EPA's 35 percent goal for the year 2010, will be increasingly difficult.

Fewer landfills and fewer waste-to-energy facilities operated in the United States in 2001 than in the previous year. The decline in the number of landfills is a continuation of the trend towards fewer, but larger regional facilities.

Packaging materials and containers continue to be the largest type of waste produced, with paper products by far the

largest material in the waste stream. Lead-acid batteries have the highest recycling rate at 93.5 percent. However, with 20 million tons recycled, corrugated boxes are the most recycled product by weight. Food waste is the biggest item in the disposal stream with more than 25 million tons thrown away in 2001.

The EPA measures municipal solid waste (MSW), also known as garbage, trash, refuse, and rubbish, as simply what is left of the products that we have used and no longer need. Whether it is yester-

day's newspaper, a banana peel, an empty beer bottle or an old computer, our trash is just the effluence of our affluence.

The EPA regulates MSW disposal through the Resource Conservation and Recovery Act's (RCRA) Subtitle D requirements. Each year, EPA publishes the agency's most recent data on the amounts of waste generated, the composition of the waste, amounts incinerated and landfilled, and amounts and composition of materials recycled and composted.

MSW within the Subtitle D definitions does not include construction and demolition debris; hazardous, medical, and radioactive wastes; or other non-household and non-business refuse. Therefore, this Executive Brief does not include those items.

The EPA's data, which is used in this brief, is just one estimate of the size of the waste stream. Other methods usually find considerably more garbage being generated and recycled. The difference is based in the methodologies being used. EPA uses the "materials flow" approach, which it first used more than three decades ago.

Materials flow uses production data by weight for materials and products in the waste stream along with estimates of imports and exports and the lifetimes of products. Newspapers, for instance, have a much shorter lifecycle than refrigerators. Food and yard waste generation is estimated based on waste sampling studies.

In addition, EPA only estimates the amount of traditional, garden-variety municipal solid waste in its data.

In actuality, waste stream estimates based on actual tonnage data from landfills and incinerators along with recycling and composting facilities are much higher. Every other year, Biocycle magazine estimates the size of the waste stream by compiling state disposal and recycling data. Their data showed 409 million tons of solid waste generated in 2000 with 131 million tons or 32 percent recycled or composted. However, many of the states include non-hazardous solid waste in their data including construction and demolition debris and industrial waste in addition to traditional MSW.

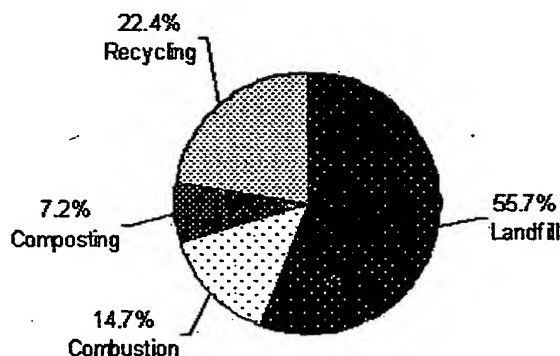
Finally, the Environmental Research and Education Foundation (EREF) surveyed all disposal facilities in the United States and estimated that approximately 545 million tons of waste was managed, of which

Amount of MSW Incinerated or Landfilled in 2001

- ▶ 161.1 million tons or 60.3 percent of MSW by weight.
- ▶ 3.1 lbs/person/day.
- ▶ 1,131.5 lbs/person/year.
- ▶ 1,858 landfills operated in the U.S. in 2001, 1,967 operated in 2000, and 5,726 operated 1991 prior to Subtitle D regulations — 18 years of landfill capacity exists in the U.S.
- ▶ 97 waste-to-energy facilities operated in 2001, 102 in 2000, and 110 in 1990 — 95,077 thousand tons per day of waste-to-energy capacity exists in the U.S.

2001 Management Chart By Process

Process	Million Tons	Percentage
Recycling	51.4	22.4
Composting	16.6	7.2
Combustion	33.7	14.7
Landfill	127.6	55.7



146 million tons or 26.7 percent was recycled or composted in 2000. The EREF data covers all non-hazardous Subtitle D solid waste that is managed outside of the generators facility. This is the broadest universe of solid waste.

The result is that the state data gives a better picture of the amount of waste managed at the state level. The EREF

data gives the best picture of the total amount of non-hazardous waste managed in the United States. The EPA data gives a consistent view of trends for individual elements of the waste stream since 1960.

For More Information . . .

"Municipal Solid Waste in the United States: 2001 Facts and Figures is available on the web at:

www.epa.gov/epaoswer/non-hw/muncpl/pubs/msw2001.pdf

"Garbage by the Numbers," a four-page collection of charts and data about American trash and how we manage it, will be available at www.nswma.org in the near future.

To discuss the data, contact Chaz Miller at 800-424-2869 or cmiller@nswma.org.

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ASSOCIATIONS**

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VD, Page 31

The road to profitability

Trash firms key on routes

By Jim Johnson

Trash companies spent years making acquisitions to build their top line sales.

Now it's time to ring out any inefficiencies created through the mergers as a way to boost bottom-line profits.

Wall Street was once in love with the roll-up — companies in a variety of industries, garbage included, out to build bulk through acquisitions.

But the emphasis these days is not so much on how much money a particular company can take in, but how much cash an operation can throw off at the end of the day.

Enter an intense look at how garbage collection trucks — the backbone of the industry — snake their way from door to door, street to street, trash can to landfill and back again.

Casella Waste Systems Inc. of Rutland, Vt., sees so-called route optimization as a natu-

See Routes, Page 19



PORTABLE POWER: Routing software from companies like DesertMicro has become increasingly in demand from waste management companies.

HAULING & DISPOSAL RANKING

- Executives agree that communication leads to success. *Page 13*
- Q & A with IESI Corp. President and CEO Mickey Flood. *Page 13*
- An analysis of the Waste News Top 100. *Page 13*
- The Top 100 waste management firms in North America. *Pages 14-18*

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Dell drops enhances

By Joe T

ROUND ROCK, TEXAS: Dell Computer Corp. has e cting for its cor while dropping it labor to recycle old

Dell launched it July 9 to make it expensive for its public customers end-of-life electron

Dell's new prog an evaluation of e ment and a re about whether electronic equipn the value. Recycli each system, whi monitor, comput keyboard. Asset : at \$59 per system will save Dell's c 50 percent from t ciated with equi tion, said Ken l president of depl for Dell.

"Thousands of

INSIDE

SUNNY SIDE DOWN: Repeated environmental violations prompt Ohio to order the closure of one of the country's largest egg farms. *Page 3*

AT DEADLINE

Fuel cell researchers receive \$75 million

WASHINGTON — The U.S. Department of Energy has grant-

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Per-ton prices for cardboard, w are expected to rise in the

ROUTES & DISPOSAL BANKING

Routes

ued from Page 1

p after the industry's consolidation phase of recent years. "I think it's always been out there, but I think it's become of more importance," said Casella President Joseph Fusco.

"Certainly as the industry and the companies in it mature, this is what mature companies do. You are relentless in the pursuit of every possible efficiency and route optimization and the trucks on it is the very basic building blocks of what we do," Fusco said.

"So it's quite natural to focus on routes and route efficiencies," he said.

"It's a natural phase in the life of a company, particularly a garbage company," Fusco said. "We went through a period of intense acquisitions. Now we're going through a period of intense efficiency."

Waste Management Inc.—the nation's largest player—has identified working on its routes the best way to save money this year and next.

The eventual goal—CEO A. Maurice Myers has said—is to eliminate 10 percent of the company's nearly 20,000 routes.

Cutting this area can have a huge impact on the company's expenses as each route costs an average of \$120,000 per year in worker and truck costs.

"We believe this is the most important cost savings opportunity for 2003 and 2004," Myers

has said.

So Waste Management is in the midst of a two-year effort to examine each and every one of the company's residential, commercial and roll-off routes.

The company wants to improve efficiency, save money and improve customer service through a program the company dubbed WasteRoute, said Alex Popov, director of fleet services and logistics.

Waste Management, through an aggressive acquisition strategy in previous years, had a network of field operations relying on different routing approaches that didn't mesh.

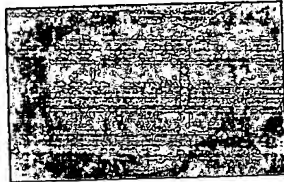
WasteRoute, which includes a proprietary software program, aims to standardize the company's approach.

Lowering costs and improving productivity is important for Waste Management and the industry as a whole, Popov said.

"It is a big push. We need to be lean. ... As everybody knows, the economy is soft, and in a soft economy you have to be efficient at what you do to stay competitive. I think everybody is struggling with that," Popov said.

"We knew that there was some

See Key, Page 20



Popov

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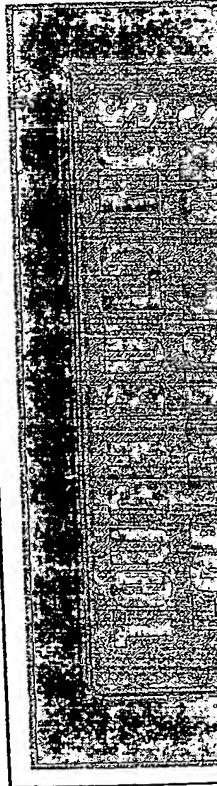
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See Key, Page 20



udy Archibald has been on front lines of communications in her job as director of community relations for Waste Management Inc. in Pennsylvania. Pennsylvania has been a hotbed of activity in recent years



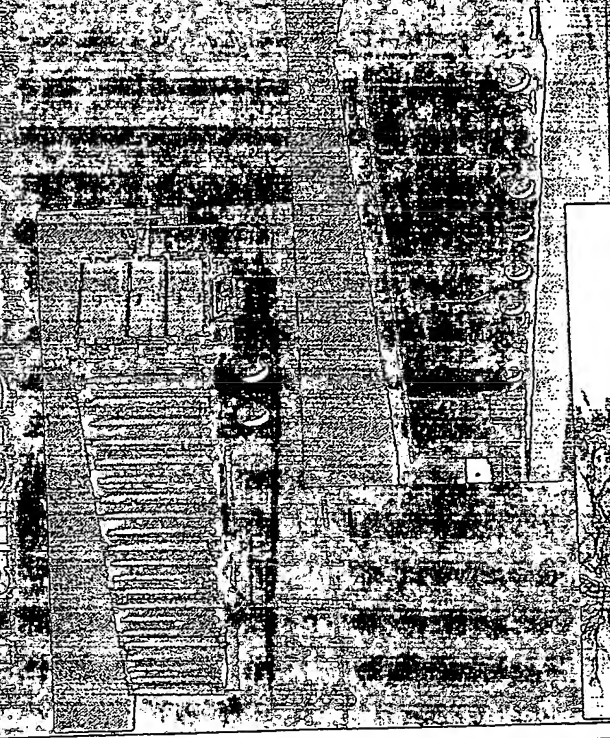
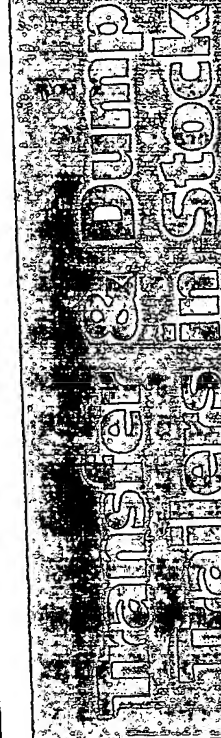
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Key

Continued from Page 19

fat in the organization that we had to clean up, that we just didn't have the tool sets ready," he said.

The process started last year with some pilot programs as the company worked on its proprietary software system to tackle the issue. Along with creating its own software, the company also formed new positions for people who work in the field to improve performance.

With a company goal of reducing routes by 10 percent, normal driver turnover should take care of any job losses without the need for layoffs, Popov said.

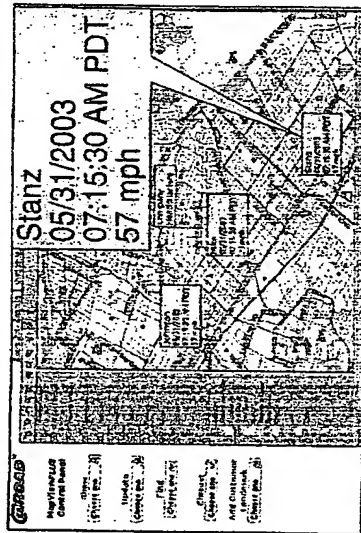
"With that attrition rate, we're training a lot of drivers on a regular basis. The attrition rate is

actually higher than the 10 percent that we're talking about. And the theory is that on a whole, attrition should take care of that," Popov said.

Waste Management, through the first two quarters of this year, was able to eliminate 243 routes, slightly ahead of the company's goal. Plans are to cut a total of 950 routes this year and another 950 next year as the program gains speed, Popov said.

Part of Waste Management's approach uses a software company called At Road Inc. of Fremont, Calif. At Road's system allows the company to plot the location and collection details of each and every customer on a route through wireless technology using handheld mobile phones or an onboard units.

"That allows companies ... for the first time ever to know all the little elements of the workday



MAP QUEST: Software from At Road shows fleet managers the location and speed of trash trucks.

out in the field. That results in a bunch of business metrics that these companies create to manage their productivity. When you're able to metric activity and people, then you can help them drive up their productivity," said J.D. Fay, vice president of corporate affairs for At Road.

"So productivity then goes up.

trash but only six hours Tuesday for a day of trash.

Modern day routing tool companies to fill what was previously down time in a drive by expanding his work area.

Grid routing, Popov said to do with the same drive in the same place every sin versus doing the most efficient routing. There's a lot of have to break in the industry this grid routing process."

"[Grid routing] says not maximizing the total drive or total paid hours of a driver given day. What I'm getting in this optimization what we a lot of load leveling in regard a driver's paid day or a day hours per day," Popov said.

WMI initially is focusing company's commercial and residential routes and will add routes later this year, Popov said. The company has about 100 routes in total, including commercial and residential.

President Barry Grahek of serMicro has seen inter route and driver productivity grow greatly in the past few years. His Jacksonville, Fla., company makes software for the trash hauling business.

Requests for help from his on routing issues have increased from two or three per month three years ago to 50 or more these days, he said. "What's really forcing the productivity is price competition in the industry," Grahek said.

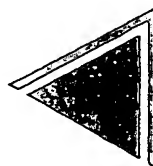
Companies going after the same municipal or commercial counts are looking for a competitive advantage and can use

Clean Up & Save Labor!

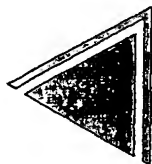
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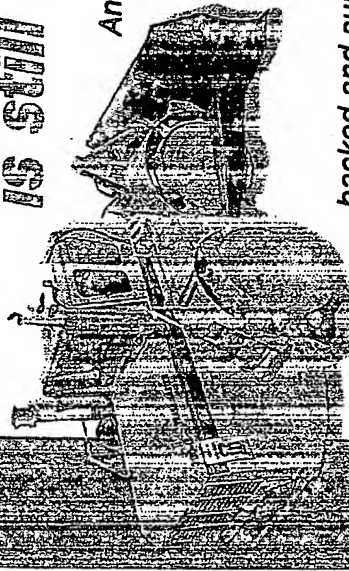
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the trash hauling business.

Requests for help from haulers on routing issues have increased from two or three per month three years ago to 50 or so each month these days, he said. "What's really forcing the route productivity is price competition in the industry," Grahek said.

Companies going after the same municipal or commercial accounts are looking for a competitive advantage and can use route productivity tools as a way to cut costs. Return on investment for route improvement equipment and software also has improved from about 12 to 18 months to 6 to 8 months in just the past three years, Grahek said.

But companies simply cannot force a new routing system on their drivers that essentially monitors their every move during the day without providing any benefit to them, Grahek said.

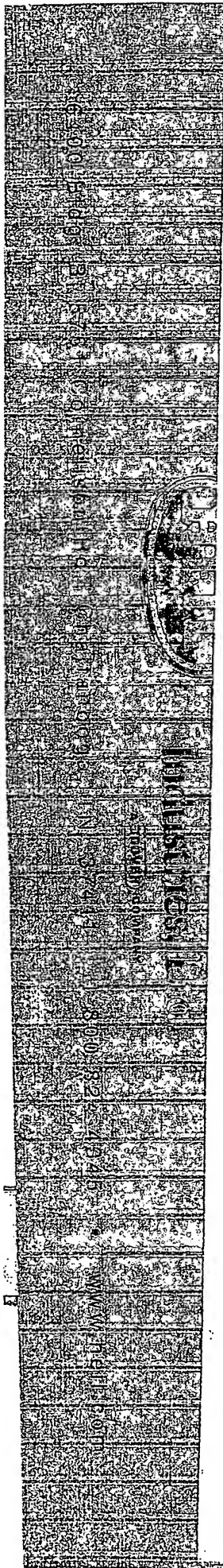
Advantages to using a new routing system include saving drivers time by automating paperwork typically reviewed or completed before and after their shifts.

Automating routing assignments also can cut down on the possibility of drivers being pulled in different directions at the last minute to handle emergency pickups, Grahek said.

"I think, in general, routing is one of many initiatives that fall into this sort of rubric of productivity enhancements that companies in the waste industry are focusing on to keep that bottom line going up," At Road's Fay said.

"It's a classic business cycle we're in where now you can't grow the top line quite as fast. But, of course, Wall Street wants to see that bottom line continue to improve. So then you figure out how can I manage my costs to keep improving the bottom line," he said. □

Contact Waste News senior reporter Jim Johnson at (330) 865-6171 or jjohnson@crain.com



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NEWS

July 21, 2003

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The News Source for Businesses that Generate and Manage Waste

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SOLID ■ HAZARDOUS ■ WATER ■ AIR

Interim EPA head draws diverse reaction

By Bruce Gelselman

WASHINGTON — President Bush's naming of Marianne Lamont Horinko as acting administrator of the U.S. Environmental Protection Agency has drawn mixed reactions from business leaders and politicians.

Horinko, who had been working for the EPA as assistant administrator for solid waste and emergency response, began her

new job July 10 and will serve until the president names a permanent replacement. A permanent administrator also needs Senate confirmation.

Horinko takes over the position held for two years by Christine Whitman. Whitman resigned effective June 27. Linda Fisher, the deputy administrator who immediately succeeded Whitman on a temporary basis, left the agency July 11.

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"I've had some personal experiences with her with [electronics] waste, and I've found her to be very responsive and easy to deal with," he said. "I've heard nothing



Horinko

negative about her. My sense she'll probably be decent — I think you'll have to give her a chance. The Solid Waste Association North America stated its support for Horinko.

"Our members, the solid waste field, and individuals throughout the United States have all benefited greatly from her commitment. See EPA, Page

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March 1999

General**8TH ANNUAL Software & SCALES SUPPLEMENT: The waste Industry Bytes Back**

Michael Fickes

Article**8TH ANNUAL Software & SCALES SUPPLEMENT: The waste Industry Bytes Back**

Michael Fickes

Waste Age, Mar 1, 1999

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In the beginning, some solid waste operations poured thousand dollars into software and scale systems only to find that neither nor the products they bought were ready for each other.

Today, however, waste management buyers and vendors have changed. Suppliers now produce user friendly systems, made possible in part by the graphical user interface of the Windows 95 operating system and its recent upgrades. And, waste managers, driven by the complex management requirements of growing businesses, have developed profit strategies that incorporate the new technologies.

In short, the waste management industry finally has begun to take advantage of computers, software and scale systems to its advantage.

Zero To 9,000 in Two Years Take the case of Southern Disposal Walls, Miss., a family business that grew out of president Charles Carr's living room when it was founded in March 1997. The company currently services and manages 9,000 residential accounts and commercial accounts in the northwestern corner of Mississippi at Memphis, Tenn., with nine trucks, including seven rear-loaders; roll-off trucks; and 120 roll-off containers.

In the company's infancy, Carr hung flyers on doors and earned residential customers in the first few weeks of operation. Jumping from zero to hundreds of accounts in a month created management problems that required help.

Carr says he decided on an accounting management software system by WAM Software Inc., Reno, Nev. Carr's lack of experience with computers required a system backed by strong customer support.

"That was important because we all were computer illiterate when we bought the system," Carr says. "If you don't know anything about computers, you need a company that provides support and a professional."

that you can grow into. My wife and I had never used a computer before. Telephone support taught us to enter accounts, do the batch payments, post the accounts and keep everything straight."

Southern uses the system to store customer information, route management, manage roll-off container rentals, handle billing and track accounts. Southern also uses the program to track fuel and landfill costs. The system generates reports that correlate all the information Southern has into an accurate cost summary.

"I can hit a button and find out what driver is handling what route, what truck on any given day," Carr says. "If I want to know how much we spent last March on landfill disposal on route three, I key in the route and the system tells me."

However, Carr says he probably only uses about 60 percent of the program's capabilities. Instead, the company gradually learns about the features as business increases. For example, the program can flag accounts for Southern's management staff when oil changes and other maintenance is required, but the company does not use this feature because its small fleet of trucks are maintained weekly.

"As we grow, we may find a need for this feature," Carr says, as in the case when Southern decided to automate the company's account collection letters to slow paying customers. "We can flag accounts that don't pay, generate collection letters on a regular basis and suspend service on accounts not brought up to date," he explains. Since the automation, delinquent account collections have increased 15 percent.

Consequently, Carr believes that the management features eventually will pay back the company's \$22,000 initial investment in hardware and software.

The company also saves in payroll costs. For example, Carr has not needed to hire extra clerical help because office operations have been minimized. "Without a system like this, we would need 10 more people," Carr says. "Even then, I'm not sure we could have managed our growth. We went from one rear-loader to seven in 14 months. Routing those trucks manually would have been a nightmare."

Southern now can create routes and alter them with route block moves. Fifty stops on one route can be selected and moved to another route in a single operation. "The system will keep the stops in the proper order as you build new routes," Carr says.

Furthermore, Carr sees on-board scale and computer systems in Southern's future because of the software. "The program will interface with on-board scales, and as the business gets more competitive as we get bigger, we may eventually go in that direction."

Tracking the Trash If managing 9,000 customers seems tough, imagine the headaches connected to managing service for 720,000 households with 2.7 million 60- and 90-gallon trash, recycling and green waste containers. That's the challenge faced by the Sanitation Department in the city of Los Angeles.

Two years ago, Los Angeles began a pilot program installing on-board computers in four of its trucks. In 1998, the pilot expanded to 7

trucks. Now the city is negotiating a contract to install on-board computers and software in its entire 800-truck fleet.

The Auto Coach on-board system, from Stone Bennett Corp., Carrollton, Texas, tracks information about all operational and truck parts. It also records revolutions per minute, speed, distance traveled, cycle time on the packer, the number of times the auto arm is engaged, rapid accelerations and decelerations, etc. The data is sent automatically over a radio system to the base station computer.

At the landfill or transfer station, a driver enters the type of material and its weight with a keypad into the system.

From there, the information can be programmed to report a class of data called exceptions. For example, a truck may stop and idle a few minutes at a red light. Even though the system records this information is not important. On the other hand, suppose a truck stops and idles for five minutes or for 15 minutes four or five times during a route. The system can be set to report such "exceptional" stops to supervisors, who then can determine the reasons for the unscheduled stops to correct problems.

"Summarizing this kind of data into reports for supervisors, management and executives has tremendous potential," says P. Abbas, who set up the pilot while working on special projects for the sanitation department. Abbas has since left the department and become a senior system analyst for the city administration. However, he remains familiar with the pilot.

Los Angeles sanitation department's supervisors manage the day-to-day work of 20 to 30 drivers or operators, Abbas says. When the system is installed, each supervisor will be able to look over a summary of daily reports that show the average number of containers collected per hour and the total number for the day. It also will show which trucks failed to meet the standard number of pick-ups per hour and which trucks required overtime.

"All of this information is used by supervisors to manage operations," Abbas explains. Another set of reports will go to district managers who oversee several supervisors and their crews. The district managers will review the commodities collected: how many containers of garbage, waste, recycling materials and regular refuse. He also will look for unusual amounts of overtime and evaluate whether or not it was justified based on container weights or the numbers of containers collected.

The system can generate reports that summarize data by month, quarter and year, as well as by district. Executive management uses these reports to evaluate the divisional work, review container collection rates, total tonnage collected and the time required to travel to and from the landfill, as well as help executives allocate resources in more rational ways, Abbas says.

The sanitation department's safety and training groups also will use the reports to monitor truck speed throughout the day and, perhaps, question a sudden deceleration or stop. Training managers will look for changes in work flow that may indicate a need for driver or route management training.

The system also will connect to on-board scales, which the Los Angeles sanitation department wants to install. "We're interested in weight motion, National Type Evaluation Program (NTEP) scales," Abbe says. However, even if they install NTEP scales, Los Angeles still not switch to a charge-by-weight collection system.

"Charge-by-weight is a political decision way out in the future," says. We're interested in scales that will automatically record weight. With a collection operation the size of Los Angeles', there are too many opportunities for errors. An automatic system can eliminate errors from the system and enable us to monitor landfill charges more accurately and make sure that our trucks aren't overweight."

Managing Commercial Collections On-board computers that assist residential collection management may drive a move to on-board systems, but commercial collectors have taken the opposite approach. They began using scales to audit customer weights and landfill charges, and to prevent overloading. And now, as business increases, commercial collectors are moving toward connecting on-board scales to waste management software applications.

Family owned Solag Disposal Inc., San Juan Capistrano, Calif., is an exception. Solag owns a transfer station and provides commercial residential collection services for five communities in Southern California between Los Angeles and San Diego with its fleet of approximately 70 trucks. Recyclables go to a privately owned material recovery facility (MRF), and refuse goes to an Orange County, Calif. owned landfill.

While Solag's owner, Jim Koutroulis, has equipped his roll-off fleet with scales, he has avoided adding on-board computers to manage the company's business.

Instead, Koutroulis has focused on finding scales that do not require continual recalibration.

Then, seven months ago, Koutroulis discovered scales from Wei Right Inc., South Hutchinson, Kan., which use position transducers. Koutroulis initially installed 12 scales on key commercial roll-off trucks to manage productivity, and this year, he plans to install five more. "These scales are not technically complicated, and they are not expensive," Koutroulis says. "The installed cost is about \$3,600 per truck."

There are two benefits to on-board scale systems. First, the scales prevent overweight tickets. Secondly, the scales help the companies justify extra charges to customers.

"When we pick up an overweight roll-off trailer, we can show the customer the readout and explain that this will cause a higher charge at the landfill," Koutroulis says. "We've never had a customer complain about extra charges when we've handled the problem this way. If the extra weight would overload the truck, we won't carry it. Instead, we bring another container and have the customer unload the heavy container."

Koutroulis sees little value in connecting his scales to a computerized waste management software application. However, he is considering a system that will enable office personnel to scan drivers' hand-written

tickets into his office waste management system to reduce the potential for errors during information transfer.

On the other hand, Smithrite Disposal Ltd., Vancouver, British Columbia, Canada, uses an integrated on-board scale and computer system to manage commercial collections, as well as to track and manage operations.

"Landfill fees in Vancouver have gone from insignificant to huge in eight years - from \$6 per metric ton to \$65 per metric ton," says Gordon Smith, Smithrite's president.

Consequently, Vancouver haulers decided to bill restaurants, homes, apartments, heavy industrial facilities, etc., in different rate categories. "We still use categories to estimate fees when first talking to a customer," Smith says, "but on-board scales make it possible to formulate pricing schedules based on average weights within categories."

To this end, three front loaders have been equipped with integrated on-board weigh-in-motion scale and computer systems supplied by Mobile Computing Corporation (MCC), Toronto. The system includes strain gauge cells welded to the sides of the front loader arms, a computer, a two-way radio for voice and data transmission, and a keypad and display for the driver.

Every day, the Smithrite dispatcher transmits routes to the truck computer via the radio. Drivers also receive hard copies of the route, which they use to note exceptions. At a pick-up, the driver punches the "arrive" button on the keypad. The display then tells the driver to "begin lift." As the driver tips the container, the scale records the full weight of the container as it goes up and records the empty weight of the container as it is lowered. The system then records the difference, the driver punches the keypad's "leave" button and the next account on the route is displayed.

Every five minutes throughout the day, the system automatically transmits pick-up data from each front loader to the company's office. This ensures that reliable data gets into the office system and enables the dispatcher to track each front-loader's location.

Furthermore, the system is flexible so that if a driver does the route out of sequence, he can scroll through the system to bring up the next customer.

"To take account of changes the driver encountered during the day, we have an end-of-day procedure that we go through with every driver to match the hard copy of the route sheet with the information entered into the system," Smith says. This allows drivers to explain extra or "phantom" pick-ups, which will show up on the report when the driver forgets to push the "arrive" button signifying that the account has been picked up.

The data is not used for billing purposes because Smithrite bills customers monthly fees, "so there is no need to transfer data from the system to our accounting system," Smith says. Instead, data is used to help manage Smithrite's commercial collection operations. The company also does not bill by weight because the scales have not been approved for that use.

The most useful report, Smith says, is the customer profitability profile, which will list every lift done for a customer between any dates. The key figure on the report is the average weight over time. "We [can] go back as far as 15 years, if we want," he says.

"Another report associates revenue with customer activity to tell me I'm winning or losing on the account."

Keeping and Building Accounts The Public Works Department of State College, Pa., uses on-board scales and a computer system to keep accounts. Because State College is one of the few municipalities that collects commercial accounts and requires both residents and businesses to pay for their trash collection, it justifies its monopoly in the local waste market by setting prices that are competitive with the private sector.

In pursuit of that goal, five years ago, the department installed a board scale and computer system in two of its four front loaders, which will handle the lion's share of commercial pick-ups. The third truck services apartment complexes in outlying areas where weights remain predictable, and the fourth truck is used as a backup.

Before installing the scales, the borough had a billing system under which everyone paid approximately the same amount. "A lot of customers complained that the system was unfair," says Mark Whitfield, public works director.

State College decided to install strain gauge scales welded to the ends of the front loaders. "The scales enabled us to set up seven billing categories and to estimate which category customers should be in," Whitfield says. However, "they were accurate one day and the next by as much as 25 percent. If a customer contested our bill, we couldn't show them data that we believed to be accurate."

Consequently, State College recently replaced its strain gauge scales and on-board computer system with Strategy, San Diego-based Instrument's load cell weigh-in-motion scale and computer package. The system is NTEP certified and accurate, says Whitfield, who attributes this to load cell technology.

Whitfield also uses the vendor's radio frequency identification (RFID) system, which consists of three components: a reader and antenna mounted on the truck, and a transponder, or tag, mounted on the container.

With RFID, the antenna emits a constant radio frequency. As the truck nears a container's tag, the frequency activates the tag, sending a signal to the reader to identify the container.

"With our old system, drivers had to stay on a predetermined route and remember to scroll down to the right customer," Whitfield says. With RFID, the driver can run whatever route he wants because the system identifies the container and records the pick up.

The system also simplifies other operations. For example, "if a container is blocked, the driver can mark the account as blocked and we'll follow up with a notice" to explain the situation to the customer, Whitfield says. "If a can is rusted out, the driver can note that on the on-board system and the information goes into our system telling

to replace the container."

In addition to justifying costs to customers, private haulers have this type of scale system useful in establishing charge-by-weight systems.

About 18 months ago, Ted Carson Disposal, Lancaster, Pa., instilled Strategy and set up a marketing program called Cybertrash to boost commercial collection business.

"When people call in shopping for a new hauler, I can quote a rate that includes a monthly service fee and an estimated fee for a certain weight," says Bernie Carson, office manager. "Many of those calls seem astounded by how much lower our quotes are compared to what they've been paying."

"Yesterday, a potential new customer called asking for a quote. He told me that he was paying \$100 a month more than what we would charge, so he's recommending us to his board of directors."

This pattern has characterized Carson's Cybertrash system for the last 18 months, as the company has brought in 60 new commercial accounts, bringing its total commercial roster to 100.

Under the Cybertrash program, customers sign a six month trial contract, instead of the typical multi-year agreement. After six months, if a company is not satisfied, it can go elsewhere. So far, no customers have left after the trial period ended, as their bills rose to unacceptable levels under the charge-by-weight system.

"We didn't want to lose them, but we can't pay to haul their trash either," Carson says.

Some of Lancaster's competitors hope that the Cybertrash program will fall through, but "if it doesn't, a lot of people will find out that they are paying to haul other companies' trash," says Ted Carson, and he thinks this is the way for a small company to build its business."

New Levels Of Automation Other waste businesses agree that the use of on-board scales and computer technology are leading waste management companies to attempt levels of automation rarely contemplated even two or three years ago.

Miller Waste Systems, Markham, Ontario, Canada, recently installed a comprehensive on-board scale, computer and wireless communication system on five front-end loaders following a year-long pilot of the system, which was supplied by MASS Corp., Markham.

Simultaneously, Miller is implementing a productivity management system from MASS along with an accounting system by Transco Systems Inc., Irvine, Calif., to service its 200,000 residential households and approximately 3,500 to 4,000 commercial accounts in the Toronto region. The company also owns two transfer stations, two MRFs and a composting facility in Halifax, Nova Scotia.

"The pilot was impressive," says Ron MacKinnon, operations manager for Miller. "We've had on-board scale systems in the past, and they are very accurate. You can put a one-pound bolt on the forks

anywhere and the scale will register one pound."

MacKinnon also likes the weigh-in-motion capability. "You don't to stop to get the weight; it's all done in one fluid motion," he s

"This system answers a lot of our concerns surrounding scale sy MacKinnon continues. "When we analyze our maintenance recoi cost of scale maintenance always has been high. If we can redu expense and also have consistent and accurate information, we ahead of our competitors."

Miller also is installing a base station, an Integrated Technology Windows-based management software module that transmits customer and routing information to and from vehicles. The soft will allow the dispatch office to alert drivers of last minute route changes via e-mail, as well as to send messages in real time. Bi information also can be sent to the base station in real time or to the customer confirming pick up times. A reporting feature th evaluates and answers productivity questions also is included.

Additionally, Miller is installing a Transcomp Tower 2001 waste recycling management system that includes Solomon IV account customer service, billing, electronic mapping, routing, performa graphing, vehicle and container management, and other waste management functions.

"Doing all of this at once is difficult, though," MacKinnon notes. advice is to get one system up and running before adding the n Nevertheless, we can see the light at the end of the tunnel now we have great expectations for systems providing this level of a mation."

Transforming the Scalehouse For many years, landfill, MRF and composting facilities resisted the move toward advanced technc systems. Integrating scales and computer systems seemed like unnecessary costs. But with the arrival of complex new facilities handle a range of material processing tasks, this notion is chang

For example, in Edmonton, Alberta, Canada, the Edmonton Pub Works department is developing a multi-use facility on 500 acre city-owned land adjacent to the city's 200-acre landfill.

This includes the construction of a new MRF owned by Browning Industries (BFI), Houston, that will process 30,000 metric tons material per year; a city-operated aggregate crushing operator will recycle rubble from municipal construction projects; and a r composting facility constructed by Bedminster Technology, Mari Ga., that will serve as an operator upon its completion in June 2

A high-tech scalehouse, which is scheduled to open by April 1 a with the MRF, also will manage material flow in and out of the s recording and tracking what goes to the landfill, to the compost facility, to the aggregate operation and to the MRF. It also will t materials that leave the facility for sale.

Once fully operational, Edmonton Waste Management Center is expected to provide one of the highest waste diversion rates in America, with composting and recycling expected to divert as rr 70 percent of the city of Edmon-ton's municipal waste stream.

With the exception of certain commercial loads and homeowner offs, most of the non-recyclables arriving at the facility will go to the composting plant first. Residual composting material then will go to the landfill, as will residuals from the MRF.

This, along with the aggregate processing operation, should enable the landfill's remaining capacity of 1.1 million metric tons to serve Edmonton's needs for another 10 years.

The scalehouse will manage material moving in and out of the facility with two in-bound and two out-bound lanes. Mettler-Toledo Inc., Columbus, Ohio, will provide four 90-foot long, 100-metric ton profile, pitless scales, while PC Automation Inc., Waterloo, Ontario, Canada's Geoware system will assist with management functions.

"We will use the scale facility as the main control point for the system," says Hugh Latta, senior project engineer for Edmonton's public waste management branch.

One in-bound and one out-bound lane will operate automatically with the help of a vehicle identification system. As a vehicle approaches the scalehouse, a transponder will send the vehicle's identification number to the system, which will verify against the company's database. The authorized number will be connected to an account, vehicle type, material category, so the system will admit the vehicle to the scale and record the weight and pass the vehicle through to the site.

The out-bound automated lane then will identify the vehicle again and record its empty weight and correlate a delivery with the material category associated with the vehicle in the database. Automatic billing also will track out-bound vehicles and materials headed for customers purchasing recycled compost, aggregate or some other materials.

The second set of in-bound and out-bound scales will be for vehicles not in the database. In this case, a staff member will handle the transaction and the driver will be required to pay with cash or credit card. Overall, the system will log payments and generate billing documents, and provide reports to help manage the facility's operations.

"There are several reports that we need to review," Latta says. "Because we have wide seasonal fluctuations, we will need to keep track of volumes or weights over time. This information will help us predict waste volumes, staffing and refuse collection equipment needs."

"We also will look for trends in the material categories moving in and out of the facility," he continues. "Are recyclables going up or down? How about MSW and commercial wastes? We need this information to allocate resources."

Latta says, depending on the level of recyclables, one or two scales at the MRF may be required. Edmonton can use the reports to determine this and to project revenues.

Indeed, scalehouse technologies are more sophisticated and they will continue, predicts Mark Wills, president of PC Automation.

"Technology for these kinds of installations has taken off in the

two years," he says. "Today, as operations become more complex with different kinds of materials, more sophisticated technology is needed to keep track of operations."

This is true for facilities as well as haulers. As collection operations grow to serve more customers who dispose of more types of materials, more sophisticated technology is necessary to ensure efficient and productive operations. Despite the original setbacks, in today's world, trash has become technical.

Updating your operation with a software program can transform a paper-congested office to one that works with "click and print" efficiency. A software supplier can sell you a whiz-bang program loaded with features. However, if the program doesn't meet your needs, it's worthless. Before deciding on the right software for your operation, consider these simple steps.

1. Know your expectations. To successfully upgrade your operation you must fully understand your needs. Ask yourself why you need a new system and determine your expectations for labor efficiency, organization, cost reduction, transaction speed and simplicity. Create a wish list of desired features. For example:

- * Ease of use;
- * Time savings;
- * Customer account information simplification;
- * Real-time reporting;
- * Multiple scales;
- * Backup utilities;
- * Networking capabilities;
- * Attended/unattended capabilities;
- * Flexible material charge tables;
- * Special rate (contract price) management; and
- * Accounting/billing.

Most software manufacturers will offer free demonstration copies of their software so you can explore a program's features before you purchase it.

2. Know your equipment. Understand the hardware and software programs you currently use. For example, landfill software can be a simple program with ticket and report printing, or a complex system that includes interfacing to your LAN or company's network.

3. Think about the future before you buy. Ask your software provider about its upgrade capabilities. Don't get locked into a mediocre

program that does not allow for expansion or upgrades. Invest programs that provide ongoing enhancements.

4. Determine the true value for your dollar. Consider market price, functionality and performance vs. consumer effect. Value is not measured in size or appearance, but rather in performance. Getting a higher cost will give you more functionality, but make sure the potential software package is consistent with the market.

5. Evaluate your support. A software manufacturer's support policy is as critical as the program itself. When you run into problems, you don't want to find yourself alone, and even software resellers may not have the answers or may not be available in your time of need. Be sure to investigate:

- * The support policy of the vendor and/or manufacturer;
- * Available support contracts;
- * Phone support charges; and
- * Support staff accessibility.

Purchasing major equipment - including software - takes time and effort, but by following these basic steps, you can eliminate many of the hassles and stresses.

Many waste processors and landfill operators find used truck scales at bargain prices - either from a company going out of business, someone who no longer needs a truck scale or at a heavy equipment auction. But if the scale does not meet regulatory requirements, it could result in thousands of dollars wasted in purchasing and in the device, site preparation and lost production time.

How can a waste processor or landfill operator know if the scale meets the requirements and ultimately be approved for use by the local Weights and Measures jurisdiction? By following a few simple rules and guidelines, purchasers can avoid potential pitfalls when shopping for a scale.

1. Look for the NTEP label. Scale specifications and accuracy requirements are established by the National Institute of Standards and Technology (NIST), Washington, D.C., and published in NIST Handbook 44, "Specifications, Tolerances and Other Technical Requirements for Weighing and Measuring Devices."

Most states and related Weights and Measures regulatory agencies have adopted these requirements and use them to approve or reject scales intended for use in commercial service.

This approval procedure is handled through the National Type Evaluation Program (NTEP), a process established by NIST and the National Conference on Weights and Measures to help regulatory officials and private industry determine whether a weighing device is Handbook 44 compliant. Most states required NTEP compliance in the mid-1980s.

Scale manufacturers, installers, and service/repair companies are

required to be licensed and meet certain knowledge and testing equipment requirements. Scale operators should contact their local regulatory officials for the requirements in their area.

2. Make sure you receive the NTEP Certificate of Conformance. After thorough testing in an NTEP laboratory, all newly manufactured weighing, measuring and metering devices are issued an NTEP Certificate of Conformance number.

Other types of associated devices that solid waste processors and landfill operators use that may require NTEP certification include weight indicators and replacement loadcells.

When purchasing a new or used scale, make sure the seller provides you with the NTEP Certificate of Conformance information. Generally, the conformance information will be required when the scale is put into service with the local Weights and Measures jurisdiction.

3. Seek assistance when necessary. Older scales often are missing identification serial numbers, model numbers or the manufacturer name. It takes an experienced eye to identify the device and determine if it is compliant or can be made to meet requirements. Consequently, if the scale you're interested in purchasing is missing information, be sure to seek advice before committing to buying a scale.

Also note that some jurisdictions will allow operators to use "pre-certified" or "grandfathered" scales, but the potential purchaser should obtain approval from Weights and Measures officials before purchasing.

For more information about Weights and Measures regulations, contact your local Weights and Measures agency or call the National Institute of Standards and Technology at (301) 975-4005.

With consolidation and change in today's marketplace, waste haulers and municipalities are faced with increased competition. One way to grow revenues and maintain acceptable profit margins, however, is to use the information provided by on-board computers and truck

For example, a computerized collection system can include an on-board scale, an on-board computer with driver display, automatic container identification, wireless data communications and management software.

Working together, this system can help you determine an accurate profitability by recording the weight at each stop, collection time at each stop and the time of day a customer was serviced. Specifically, computerized systems can provide detailed data on day-to-day operations such as:

- * Accurate container weights;
- * Pickup sequence, time and date;
- * Exceptional route events;
- * Pickup time-to-collect;

- * Off-route time;
- * Total route time; and
- * Container location, condition and maintenance activity.

This information can eliminate the guesswork from developing schedules, and is especially helpful in setting prices for new accounts. For instance, a waste hauler can assign each current customer a Standard Industrial Classification (SIC) or North American Industrial Classification System (NAICS) code to track the average weight time to service that type of customer.

Using that information, the hauler can compile pricing schedules for sales force that groups potential customers into pricing categories based on historical averages.

Additionally, computerized collection systems can help waste haulers:

- * Improve route efficiency;

- * Identify heavy and light accounts to adjust billing;

- * Improve customer service through the availability of up-to-date pickup data;

- * Manage inventory assets such as identifying lost or damaged containers; and

- * Analyze overall profitability of each account.

For example, if a hauler currently operates in a franchised area and will be put up for competitive bid, the computerized system will have a historical record of all of the franchise's accounts. Armed with that data, the hauler can evaluate how to improve collection methods, increase route productivity and profitability while providing value-added service to the municipality.

Municipalities also are facing a stronger competitive environment in managed competition. One way municipalities can become more competitive is by implementing a bill-by-weight system using on-board, legal-for-trade scales as a competitive marketing tool.

The key to succeeding in today's collection environment is to provide excellent service at a competitive price. An on-board computerized collection system can provide the additional data required to help make important business decisions to take your operation to the next level.

As the waste industry has transformed from a predominantly family business into a competitive market, keeping revenues up, expenses down and remaining productive has become increasingly important.

Productivity can be measured in expenses per day, per route, per hour of truck, per commodity carried, per employee, etc. On-board scales are one tool to help maintain productivity, as they allow you to evaluate and optimize revenues per load, to maximize loads per hour and to reduce expenses.

Optimizing revenues per load. Scales immediately determine how accurately you've quoted a job and evaluate your pricing. A 10 percent drop in revenues can result in a 100 percent drop in job profits. However, using a scale to load trucks to capacity with each run helps you use your fleet to its fullest potential.

Scales also will help you determine how many trucks you need. Remember, a competitor that can do a job with fewer trucks will be rewarded the contract.

Maximizing loads per day. There are several landfills available to choose from. On-board truck scales can be a vital component in determining the profitability of each load, taking into consideration the lowest cost per load, trash weight, trash type, distance between landfills and the distance to the next container.

Reducing expenses. Maintenance costs rise as a truck gets heavier because tires, brakes and other suspension and body parts suffer from the abuse. An on-board scale helps control these costs by preventing overloads. It also helps you distribute weight properly to reduce vibration and wear.

Overall, on-board scales can help you position your business to take advantage of the niches that develop within your market and by helping you maintain competitiveness.

Fragmented business systems are all too common - and too costly - in the refuse and recycling service industries, as waste management personnel in organizations of all types and sizes struggle through operations with incompatible accounting and billing systems, mapping and routing procedures and sporadic asset tracking. The result? Wasted time and money, overworked staffs and very often unsatisfied customers.

An integrated automated system, however, can improve customer service while streamlining all areas of a waste operation from the office to the curb, including:

- * accounting and billing;
- * customer service and routing;
- * vehicle maintenance;
- * asset tracking;
- * truck computers and scales;
- * radio frequency identification (RFID);
- * weigh station management;
- * bar coding; and
- * sales automation.

Waste operations need to be able to bill on time, provide service

efficiently, address customer inquiries quickly and have easy access to management reporting functions.

For example, if a customer calls to ask why his last bill was higher than usual, the customer service representative receiving the call typically must request the pertinent historical billing data from the accounting department then call the customer back - hopefully the same day.

The better scenario would be to have instant access to that customer's billing and accounts receivable records, allowing the caller's question to be answered during the initial call. An integrated automated system could provide that instant access, thus enhancing customer service and saving a significant amount of time.

No system solution incorporates every automated task, but careful planning can ensure that new systems are not islands of automation. One option for an integrated system is the traditional Enterprise Resource Planning (ERP) approach. ERP is an enterprise-wide management system that integrates all of a business' processes and keeps customer satisfaction in mind. However, while ERP strives to address the 4Ms - man, money, materials and machines - to their best advantage, the process is expensive and time-consuming to develop and implement.

Another approach to system integration is the use of core business applications that take advantage of open architecture standards such as Structured Query Language (SQL), which manages data, data formats and software design independently. These standards make it possible for easy integration and extension of the latest industry applications that run on popular PC platforms, such as Windows and Windows NT.

Many software development companies have created applications using this open architecture technology plus incorporated industry-standard tools such as Crystal Reports and FRx Report Writer. This allows businesses to easily customize, extend and integrate the "best of breed" applications throughout their organization.

Additionally, some companies have developed comprehensive waste management systems for Windows that seamlessly integrate accounting, billing, customer service, routing, GIS, vehicle maintenance, asset tracking and management reporting.

In this scenario, all work in the system is transferred and tracked electronically from one department to another, thus creating a paperless environment. As work is performed, it is checked off in the system as "completed," and electronic records are created for archival and management purposes.

One caveat when creating your integrated automated system is to be aware of the fast approaching Year 2000 (Y2K) bug, as it could have devastating effects on your operation. The thought of suddenly all your business records disappear or become corrupt should be reason enough for you to properly investigate the likelihood of a hardware or software problem. [For more information on Y2K, see "Ghost in the Machine," World Wastes June 1998, page 38.]

It's unlikely that all of your systems are safe, especially if you are using a DOS-based application or applications that have been

converted from DOS that use a Windows front end. A prudent s
would be to analyze your system requirements and chart an int
systems course that will take you safely into the next century.

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Michael Fickes

Waste Age, Mar 1, 2001

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Waste industry information managers are overseeing a wholesale transition to advanced communication networks that tie far-flung branches, sales representatives and headquarters into integrated powerhouses.

Internet technology forms the basis of most of these efforts, with a number of variations on Internet themes provide companies with opportunities to tailor their networks to individual needs. The new variations go by several names, including Virtual Private Networks (VPNs), Intranet Networks and Internet-based Application Service Providers (ASPs).

Despite the concept variations, the goals remain similar. Companies want to boost the quality of customer service and operating efficiency by increasing the speed of data processing and information flow among company personnel wherever they may be, whatever they do. In addition, companies want to control the cost of technology solutions.

Advanced networking technologies provide these benefits.

Waste Industries Inc., Norcal Waste Systems Inc. and Stericycle each have implemented different networking strategies aimed to garner these benefits. Here's a look at what they are doing and

Waste Industries' VPN

As the nation's seventh largest public waste management company, Waste Industries, Raleigh, N.C., maintains 43 locations including home office, nine landfills, and commercial and residential collection facilities spread across eight southeastern states. The company stands at 800 trucks. Company employees number 2,000.

Managing such widespread operations requires a sophisticated

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By Kathleen M. White

approach to advanced network technology.

Throughout the 1990s, Waste Industries' branches connected to an AS-400 IBM mid-range computer located in the corporate office through telephone lines and satellite uplinks. This system allowed the branches to engage in real time processing in financial routing, dispatching and maintenance applications hosted by the AS-400. However, the system did not provide Internet access to branch locations. As a result, only the home office had e-mail capabilities.

The system worked well, company officials say. But the lack of Internet access and company-wide e-mail presented increasingly unacceptable limitations.

In the middle of 1999, Brandon Peacock, the company's web and communications manager, met with company officials including Charles Lee Hicks, the systems manager, Stephen Shaw, the CFO, and Phyllis Mews, the billing supervisor, to discuss building a more comprehensive network.

Waste Industries' system integrator, System Operation Solution (SOS) based in Raleigh, also participated in these discussions, and produced several specific customer service goals. In particular, company officials wanted to improve the quality of billing by adding online bill paying, reducing errors and making more billing information available to customer service personnel so they could discuss it with customers.

SOS recommended a Virtual Private Network, or VPN. "A VPN is a secure pipeline that uses the Internet as a pathway," Peacock says, "but with encrypted data passing through the system behind a secure firewall. A VPN provides the same kind of security and reliability as a dedicated Intranet, but it does not use dedicated data lines, which is a pricey."

SOS designed and implemented the VPN for Waste Industries, taking most of the company's branches online during 2000. All of Waste Industries' branches now communicate through the new VPN.

Branches connect to the system with the best quality connection available, using always-on telephone line connections such as ISDN and DSL as well as dial-up connections provided by an Internet service-provider (ISP) in areas not offering the more advanced connections.

The new system allows company-wide access to both the Internet generally and the VPN. Desktop computer users in the branches can communicate with headquarters and each other using standard Internet browsers and e-mail.

Meantime, branches will continue to use the software applications hosted by the corporate-based AS-400 computer. These programs include World financial software supplied by JDEdwards of Denver, billing, routing and accounts receivable software from SoftPak, Inc., San Diego, Calif.

But the VPN provides a host of additional benefits. "We've revolutionized our billing system," Peacock says. "Before installing the VPN, we used SoftPak to create our billing files, which go to ExpressBill, Toledo, Ohio."

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Recycling Symbol Negotiations Spark Debate in Canada

Ohio, a company that prints, stuffs and mails the bills. To check ExpressBill would pull 30 or so samples from each branch office fax them to our home office for spot checking. SoftPak data file not show the final results in the same form seen by customers. result, spot checking could miss things, and errors occasionally occurred."

The VPN has enabled Waste Industries to address this problem. branch can now proof its own bills. Prior to printing, ExpressBill images of the bills on a website located on a Waste Industries s This site was developed with a software product called NetView, created by PFC Technologies, Woodland Hills, Calif.

To proof the bills, a billing manager in a branch office simply op Microsoft Internet Explorer and logs into the company website t houses these images, proofs the bills, and requests changes and corrections from ExpressBill via e-mail.

After printing and mailing the approved bills, ExpressBill sends t final bills to another Waste Industries website using NetView. Ir of individual bills remain at this site for 6 months. When a custc calls a branch to question a bill, a customer service representat call up an image of the bill in question, along with the SoftPak c showing current balance and payment activity.

Without the image of the bill in question, the customer service representative had no way to backtrack with the customer to fir source of the problem, Peacock says. "As a customer support is this was unacceptable. We want to look at the same bill they ar looking at when there is a question."

Images of bills older than 6 months are preserved in CD archive

To complement the new system, Waste Industries is adding and billing system feature: online billing. This system will use PaySe product made by TriSense Software Ltd., Burnsville, Wis., and currently is being tested in one branch office.

"We are sending fliers stuffed in bills informing those customers they can go to a Waste Industries' website and sign up for onlin payment," Peacock says. "The customer will then create an acc that site. The site will notify us, and we then code that custome billing file for electronic billing only.

"When a bill is prepared, the system pulls the file from the pape billing system and sends it to a TriSense website," he continues "TriSense creates an image of the bill that resembles the paper e-mail message notifies the customer that the bill is available a offers a hyperlink that takes the customer to a screen allowing l payment. Upon logging into that site, the customer sees the du with credit card and bank-draft payment options."

Currently, 10,000 Waste Industries customers pay their bills thr an auto-draft system under which their accounts are drafted automatically each month. This system forces a customer to pa certain date and also requires Waste Industries to key payment into the company's internal accounts receivable program by har

The new system will address both of these problems. The custo

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controls the payment date by communicating with the TriSense website. In addition, when bills are paid, TriSense creates data payment files that move automatically out of the accounts receivable files and into paid files.

According to Peacock, CTP Solutions, Agoura Hills, Calif., integrates the ExpressBill, PFC and TriSense applications to provide these services.

What makes all of these different data manipulations possible, however, is the communications network — the VPN in Waste Industries' case.

The Thin Network at Norcal

With 22 collection, transfer, landfill and recycling locations, Norcal Waste Systems Inc., San Francisco, has grown large enough to efficient network communications. The company currently is migrating from a network based on leased telephone lines to a private Internet using Internet communication methods.

An Intranet uses dedicated data lines to create a network. Contrary to the Internet are limited and carefully controlled. This differs from the VPN used by Waste Industries, which uses software to secure a network that operates over public Internet lines.

"This system will enable us to distribute all of the applications required by our accountants, operations supervisors, clerks, customer service reps and managers across the network from a central location," George McGrath, senior vice president and chief information officer at Norcal. "Information technology costs are not measured by a cost-benefit analysis. Instead, costs are measured by the total cost of ownership: what it costs to own computers and software. The incentive behind our server-based distribution system is to reduce the total cost of ownership."

According to McGrath, a "thin client" will produce these savings.

Who or what is this skinny client?

A web browser running on a desktop computer is a client. When surfing the Internet, this client-browser accesses web pages that reside on other computer servers located across town or on the other side of the world. The client-browser asks the server for information, and the server serves the information up on the desktop screen.

Until a couple of years ago, client-browsers or other client software brought information back from servers and processed it on a personal computer desktop.

While this is still done — and done often — it's no longer necessary.

"Think of a computer the size of five pancakes stacked on a plate," McGrath says. "This equipment has no hard drive or CD-ROM. Various applications from servers in our corporate offices to these 'thin' clients in our subsidiary operations. These devices allow you to do everything you can do on a PC, but the processing and storage is done at our headquarters."

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In other words, a thin client doesn't have any application software.

"[It's] nothing but a web browser," McGrath says. "These devices cost less than \$500 each, so they are inexpensive to purchase. In addition, we don't have to install software in each machine. If we want to upgrade a Windows application to the next version, we simply copy it here in the corporate office. Everyone in our subsidiaries has instant access to the new version."

Of course, Norcal must pay for all of the software it uses. But it doesn't have to pay a lot of people to keep a far-flung system up and running. "I don't have to add staff to maintain our back office, operations, or customer service work," McGrath says. "If we buy another operation, we don't have to hire a technical person to integrate that company's operations with ours, we simply implement thin clients in the new operation and everyone uses the system here."

The Norcal thin network not only reduces the total cost of ownership mentioned by McGrath, it also offers the same kinds of benefits available through a Waste Industries' VPN.

For example, McGrath is experimenting with an online bill payment option and developing customer service enhancements, such as scheduling pick-ups and calling for maintenance online. He also is investigating incorporating routing and a global positioning system (GPS) into the network.

Stericycle's Alternative Thin Client System

In the past year, Stericycle Inc., Lake Forest, Ill., virtually doubled its size by acquiring Browning-Ferris Industries' medical waste operation. Now, Stericycle operates 80-plus locations in the United States and Canada. A large network of sales representatives also raises the number of locations requiring computer access to Stericycle headquarters into the hundreds.

Two years ago, planning for growth, Stericycle's corporate headquarters and 20 or so facilities implemented a Transcomp 2001 System, which administers contracts, pricing and exceptions, plus dispatching, routing, order entry, billing, and accounts payable and receivable.

To make it easier to bring new operations online, the company attached the Transcomp system to a thin client Intranet, which has a different look than the Norcal thin client system.

"The Tower 2001 allowed us to do our own Intranet development, which integrates [it] with other specialized medical waste systems important to our business," says Patrick Cott, Stericycle's vice president of information. "For example, we use a bar-code system to coordinate our transportation and billing operations. One of the important parts of the system is the SQL Server, which snapped easily into our overall system."

The Stericycle network enables all of its locations to communicate with the main data center located in Lake Forest via a browser such as Internet Explorer. Most of the computer processing work in the company occurs at headquarters, with the browsers requesting operation from the Intranet. This is a thin client software system.

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 By Danielle Onorato

Products

"When we say thin, we're talking about the software element," says. "We haven't made a distinction about the hardware. Our motivation is to make the system accessible and to make network utilization efficient."

"From a pure processing perspective, we want to make all interaction with our core system thin," he continues. "But we also want people to be able to process information offline. This is done by taking data through the browser and populating a program on a desktop. For example, many of our people want reports done in different ways. The system distributes or pushes reports to people in the branches in files. By bringing up the data in Excel on their own desktops, they can slice and dice the data any way they want and create their own reports without the involvement of our IS department."

This system allows everyone access to the information he or she wants, but all that travels through the network is data, not pre-packaged reports that might require larger, more expensive data.

In addition, Stericycle has not had to replace desktop computer focused on a thin hardware concept. "Most desktop computers that are so much faster than you probably will ever need," Cott says. "When these computers communicate over the network, they use browsers. When they process data, they use application software installed in the desktop."

The Large and Small Networked Future

While larger companies have so far seemed to be the ones implementing networks to integrate offices, small companies with two or several locations also can benefit from this concept.

"Generally, the direction of software is to be Internet-enabled and run over a network through a browser," says Pat Sweeney, president of Transcomp/wasteclick.com, Orange, Calif. "Later this year, we plan to launch an ASP component of our wasteclick.com portal. This ASP will do the same thing for many companies over the Internet: It enables you to keep your books and run your trash business with a browser talking to our product. Whether you use this web-based concept on an Intranet like Stericycle or through an ASP depends on your preference and your size."

In other words, some large companies may want to outsource their data processing through an ASP simply because they prefer to invest in other areas of their business.

On the other hand, smaller companies may not have the capital to invest in powerful, full-featured systems.

But both kinds of companies can subscribe to an ASP and tap into the features of high-end systems.

Connecting to an ASP is like connecting to America Online, Dullcom. The difference is that America Online offers entertainment, newsgroups, games, and various consumer features. But an ASP offers high-end application systems tailored to the needs of different businesses.

"You pay for these systems through a fixed monthly subscription fee."

based on the number of users in your company," Sweeney says "There is no start-up cost and no need to invest in technical staff or internal systems."

Eventually, these systems will offer all of the services of the desktop VPNs and Intranets used by companies such as Waste Industries, Norcal and Stericycle, including online accounting, dispatching, and other back office systems. Online bill-paying and other customer service systems also will be available.

What will you need to use these systems?

Nothing but the 'Net.

Michael Fickes is Waste Age's business editor.

Unscrambling the Acronyms

Want to upgrade your system but don't understand the lingo? Here are the acronyms unscrambled.

ASP: Application Service-Providers

CD: Compact Disc

CD-ROM: Compact Disc Read-Only Memory device

DSL: Digital Subscriber Line

GPS: Global Positioning System

IS: Information Systems

ISDN: Integrated Services Digital Network

ISP: Internet Service-Provider

SQL: Structured Query Language

VPN: Virtual Private Network

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Start your cost-containment efforts with the efficiency of your collection and transfer operations.

By Thomas M. Roth

Many local governments are being hit hard by budget shortfalls. Residents are demanding better services for their tax dollars. The cost of environmental compliance is rising while the volume of solid waste generated per capita is increasing annually. The United States Environmental Protection Agency reports a 70% per-capita increase in the generation of solid waste in the US over the last 40 years.

Local initiatives, such as waste reduction, recycling education, Pay-As-You-Throw programs, and mandatory container deposits might provide some benefits through cost reduction in a solid waste disposal program. These activities are all laudable; however, such behavior modification programs are only part of the answer to cost control.

Significant cost reductions and efficiency improvements in the municipal solid waste field have been brought about recently through technological advances affecting waste collection and hauling. The use of onboard data systems on waste collection vehicles has proven beneficial to many waste handlers, be it a public utility or a private enterprise.

Onboard data systems can provide many benefits to waste operators. Geographical positioning system (GPS) receivers can improve routing efficiencies by tracking vehicle locations. Automated data collection systems can reduce route times and

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increase the accuracy of billing information. Wireless transmission of data between vehicles and central stations can reduce data-handling costs and expedite the billing process.

Vehicle Tracking

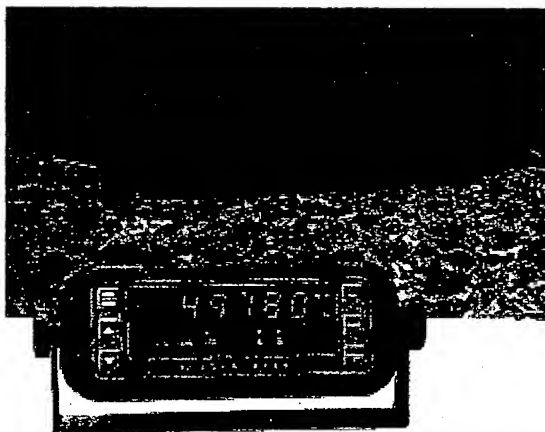


PHOTO: VULCAN

Transfer vehicle scale with V300 electronics



PHOTO: VULCAN

Front fork scale with V600 electronics

The makings of a revolution in fleet management began in the mid-1990s when the US Department of Defense completed its network of 24 GPS satellites, which now orbit 11,000 mi. above Earth. These NAVSTAR satellites were designed for military applications, but civilian use of the GPS satellite signals became widespread after technological innovations resulted in dramatic reductions in the size and cost of GPS receivers.

Small, inexpensive GPS receivers found an obvious application in vehicle tracking, providing fleet managers with real-time monitoring of vehicle locations. The use of GPS for such applications as this is a relatively recent innovation in the MSW

field but one that is quickly growing as more organizations discover the benefits it has to offer.

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Doug Damon with fleet tracking applications provider InSight USA estimates a market penetration of less than 15% of the solid waste field. Damon claims that "everybody's talking about it," but usage is still much less than in the service industry, which has been quicker to adopt the technology.

One recent adopter of GPS technology is K&F Industries Inc., which began tracking its Indianapolis, IN, fleet of recycling vehicles a little more than a year ago. Chief Financial Officer

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Matt Cole quickly became an advocate of GPS-based vehicle tracking. The system was originally installed to establish accountability of the drivers who, as Cole says, are "off-site and out of mind" while driving their rounds. Although K&F has weeded out some bad drivers, that is not the primary use or benefit of the system. Cole sees route optimization as a better use of GPS monitoring systems and doesn't feel that the company uses vehicle-tracking data to look over the shoulder of each driver during every working hour.

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Most drivers at K&F are assigned routes designed to visit customers on a regular schedule, with additional pickups on an as-requested basis following completion of the regular routes. The problem for dispatchers, according to Cole, was that they "didn't have any way of knowing how long runs should take or what was done for the day."

K&F selected InSight USA's StreetEagle Waste Management solution, which includes software with built-in routing capabilities. The software determines the theoretical time to complete a route based on average highway speeds and anticipated loading time per customer. Although K&F doesn't employ real-time monitoring of their drivers, they can compare actual route times to the predicted route times and identify where inefficiencies might exist and where scheduling improvements can be made.

Don Weigel, director of products and services for Trimble, a leading provider of GPS technology, identifies this "calibration" procedure—along with "correction" and "compliance"—as one of the "three Cs of GPS" in the waste management industry. Trimble has customers who are not ready to invest in a full-fleet tracking system but who do use tracking devices on a limited number of vehicles to develop data for time and motion studies. Assumptions don't take into account actual conditions, such as narrow alleys with limited loading areas or multiple containers that must be moved to gain full access for loading. The actual load and drive times are recorded and can be used to optimize route planning, which was Cole's goal in implementing GPS tracking at K&F.

Vehicle tracking data are generally provided as either real-time tracking or in-batch reports. Real-time tracking is most useful for larger haulers with dedicated dispatchers who frequently must reroute their trucks as calls for pickups or container drops are phoned in during the day. In these cases, dispatchers typically spend a good part of their day in front of computer monitors, where they can see the current location of every vehicle and dispatch the nearest truck to a customer's location. Batch reports, though, are useful for any size fleet. Damon finds that these management reports provide business intelligence

that is extremely valuable—but only if it is used properly. "If you do nothing with it," he says, "it's worth nothing."

At K&F, the data are used by the traffic department, which reviews the management reports on a weekly basis. If a driver's performance is seen to decrease, the traffic department looks into possible causes. Cole has found that performance problems often are caused by customer procedures. For example, increases in traffic at a customer's facility might cause long loading delays, which can be solved by changing the service time for that location. Likewise, Weigel points out that tracking data might show long waits at a company's own scale, which would justify the expense of adding another scale.

Mike and Cindy Leichner, owners of Pride Disposal in Sherwood, OR, use Routeware's DMS3000 system to optimize their collection operations. "Its in-truck system gives us a complete time stamp on our collection, travel, cleanup, and dump activities," Mike explains. "It's hard data, so it takes the guesswork out of what's actually happening out on the routes."

Pride Disposal offers a full line of services, including rollofs, commercial and residential collection, and recycling services at the company's transfer and recovery facility. The Routeware system installed in the company's trucks has two buttons, green and red, to assist in the ease of recording the pickups or misses, or the driver can go to the screen to record special situations.

"Routeware allows us to prepare detailed reports to justify our charges to the different customers and jurisdictions we serve," Mike explains. "Because of the system's GPS location-validating capability, we have been able to satisfy our customers' questions quickly and accurately."

Another example of the "correction" aspect of Weigel's three Cs of GPS includes that of employee misbehavior. Weigel says drivers going off-route are rampant in the waste business, and GPS tracking will quickly identify those drivers who make side trips, either for personal reasons or to perform unauthorized collections that aren't reported. Likewise, GPS addresses compliance, which is Weigel's third C. The best route optimizations won't work if drivers decide they know a better route, and vehicle tracking can identify those drivers who don't follow the assigned routes.

Tracking can also work in a driver's favor. Cole relates the story of an overdue K&F driver whose cell phone malfunctioned during a route. The GPS tracking data were used to find the vehicle and to verify that the driver was still in transit, eliminating the need to have a supervisor drive the route to see if the driver was in trouble. The tracking data have also been used to support

drivers when customers complained that a driver missed their location. Dispatchers are able to confirm that a vehicle has visited a customer facility on schedule, even though the customer might be unaware that the pickup has already been made.

Tracking device installation is relatively simple, often simpler than installing a car stereo. The devices are usually placed in an out-of-the-way location, such as beneath the seat or behind the dashboard. Hardwiring the units into the electrical system is recommended to reduce tampering with the units. Drivers have been known to disconnect GPS units, so K&F installs tamper-resistant plates around its GPS units, and InSight uses tamper-evident tape on all wiring installations.

Automated Data Collection

Many GPS-equipped onboard data systems are capable of more than just identifying a vehicle's location. Anything operating on the vehicle's 12-V power system or using the vehicle's PTO can be monitored, with the time-of-device activation or deactivation recorded and reported.

The vehicle ignition switch is a common device to tie into the onboard data system. Recording when the ignition is turned on for the first time each day and when it is turned off for the last time each day can be a reliable timekeeping method and is especially useful when vehicles are parked in remote lots with no supervisory personnel. If ignition events are monitored for this purpose, it should be in conjunction with a review of GPS location data, as drivers have been known to idle trucks for long periods before leaving the lot and to drive around aimlessly before returning to the lot to avoid making additional service calls at the end of the day.

Monitoring ignition events and location data is also useful for evaluating vehicle idle times. Reducing idle times also reduces fuel and vehicle maintenance costs. If extensive idle times are recognized, corrective steps can be taken, which might include changing loading procedures or working with customers to reduce long waits at their facilities. Because GPS receivers record both time and location, tracking software easily can identify periods of time when the vehicle is not moving and, when combined with monitoring of ignition events, can generate reports showing idling durations and locations.

Lift events can also be monitored, with the time and the location recorded each time the lift is activated. Waste haulers can determine the coordinates of their customers' locations based on street addresses and enter these data into their GPS tracking database. The GPS receiver records the vehicle's coordinates

every time its lift is activated. Tracking software then compares these coordinates to those previously loaded into the database and matches the location with the customer. Bookkeeping is reduced, and the driver spends time traveling to the next location instead of recording service calls. An added benefit is that unauthorized pickups are reduced because dispatchers easily can identify lift activations occurring at locations that don't match known customer locations.

Whether a vehicle is equipped with a GPS tracking unit or not, onboard scales represent another leap in waste management technology. Onboard scales have been developed for many different types of waste-hauling vehicle configurations. Stress-Tek Inc. of Kent, WA, manufactures several different systems for its Vulcan On-Board Scales product line. Vulcan scales are available for tipping and fixed refuse bodies, rolloff haulers, hooklifts, transfer vehicles, and front fork loaders.

Body scales from most manufacturers provide information on total load weight and are most useful for checking gross weights to avoid fines for overweight vehicles. These devices don't always provide accuracies that make them suitable for billing purposes, but Weigel has seen onboard scales used for auditing purposes and for route planning. Gross weights can be plotted, and standard deviations can be calculated for all customers. An evaluation of the standard deviation for each customer can be used to optimize routes. In operations that bill by volume or by number of service calls instead of by weight, tracking of changes in gross weight over time could increase fees only for customers whose weight is significantly above that of the average customer.

For curbside waste haulers who bill based on weight, lift-based scales might be worth serious consideration. With these systems, the standard original equipment manufacturer lifts are replaced with lifts having integrated scales. On a typical front fork system, the existing forks are replaced with fork scales that tie into a meter in the cab. The driver can record the weight from the meter readout. More advanced systems can record the date, time, and customer information in addition to the pickup weight.

Weigh-in-motion or dynamic systems offer an advantage over static weighing systems in that driver productivity is not reduced. Weights are measured during the lift cycle, and the lift does not need to be stopped while a reading is obtained. With the LoadMan onboard fork weighing systems from Creative Microsystems Inc. of Renton, WA, onboard microcomputers take into consideration the fork angle, arm angle, velocity, and acceleration throughout the entire lifting cycle. Creative Microsystems claims a weight accuracy of 99% in the net weight,

obtained by weighing the container while it is being lifted and reweighing it after it has been emptied.

Likewise, SI Technologies Inc. of Tustin, CA, claims a typical accuracy of 1% of the load for its Route Man weigh-in-motion fork-based onboard scales. The Route Man system directly replaces the standard forks on commercial frontloaders. One-button operation allows the driver to collect the bin weight and additional customer information for up to 1,000 pickups.

Onboard scales are also an option for residential curbside pickups. LTS Scale Corporation of Twinsburg, OH, developed the EnviroScale line for the waste industry. In addition to scale forks for commercial front-end loaders, LTS provides two types of systems for residential collection.

The fully automated sideloader truck with weight hopper uses a grabber arm to pick up the curbside refuse container. A transponder on the grabber arm communicates with the onboard computer system via a truck-mounted antenna. The computer opens the customer account record while it reads the weight of the hopper. The grabber arm dumps the container contents into the weight hopper, then the scale system records the hopper weight and calculates the net weight of the refuse while the arm retracts.

LTS also manufactures semiautomatic scales for side and rear tippers. This scale is mounted to the truck body with the tipper on either the side or rear of the vehicle. The tipper lift raises the container to its weighing position, and the weight is recorded and transmitted to the receiving system in the cab. After the load is emptied, the container is returned to the weighing position, and the empty container weight is read. The net weight is computed and recorded while the tipper lift returns the container to its curbside location. This system is an example of the static weighing process, which requires six to nine seconds, according to LTS.

Wireless Data Transmission

The data collected from the onboard systems, whether GPS tracking data, pickup weights, or readings from other monitors, must find their way back to the office if they are to be used. In the past, the data were commonly stored in the onboard system and downloaded in a batch at the end of the day. Many of today's systems, however, use wireless technology to transmit the data to receiving systems at regular intervals.

Batch processing obviously limits the use of the data and eliminates the ability to conduct real-time vehicle monitoring. There are also unseen costs to batch processing, however, that

waste operators might not take into consideration.

"A lot of people assume a wireless product is more expensive than a 'dumb' data logger," says Weigel. "Look at the total cost, including someone to download the data and truck wait times." Weigel has seen trucks idling in line at the end of the day while someone connects a cable to individual vehicles to download the data. The actual cost of wireless might be less than expected.

Wireless transmission commonly makes use of cellular telephone technology, but the transmission method for nonvoice data varies from that for voice transmission. In voice communication, a voice channel is kept open during an entire communication session, similar to the way in which landlines operate. Nonvoice data, such as those from onboard tracking, monitoring, and weighing systems, are transmitted using a system known as "packet switching." The data are compressed and sent in short bursts between voice communications or during gaps in conversations on voice channels. This is how newer cell phones send and receive text messages, e-mail, and Internet data.

This is a greatly simplified explanation of wireless technology, and new users are likely to encounter myriad confusing acronyms such as GPRS (general packet radio service), GSM (global system for mobile communications), 3G (third generation GSM), TDMA (time division multiple access), CDMA (code-division multiple access), and 1xRTT (single-carrier radio transmission technology). Don't get hung up on the pros and cons of these technologies; they are simply different specifications or methods for transmitting data through the services of commercial cellular carriers.

Rather than worry about the transmission technology, potential users should be asking questions about coverage, reliability, and the cost to upgrade. Many cellular companies are in the process of changing their network from one type of system to another, and these systems are not all compatible. If the carrier changes its network system after you purchase your equipment, you might need to upgrade the transmission system on every vehicle. Some companies offer modular systems that make this upgrade simple and relatively inexpensive, but other systems might become obsolete. A reliable vendor of onboard data systems will be knowledgeable in wireless technology and should be in touch with trends and what the local carriers are planning.

Putting It All Together

Onboard data systems can obviously generate large volumes of data, which must be reviewed and analyzed if they are to provide meaningful results. Fortunately new users aren't left alone to

figure out what to do with all of this information.

Many vendors of onboard data systems also provide full software systems that will collect the data, store them in a database, and generate standard or customized reports. In many cases, users won't even need to install any software, as the data and reports are made available over the Internet using a standard Web browser.

Wireless systems will usually transmit your data back to the supplier, where they are stored in a database accessible over the Web. This eliminates the need for data specialists, software installations, and data backups, as all data-handling occurs at the supplier end.

As an example of what a Web-based system can provide, the Telvisant system from Trimble provides a suite of hosted applications, which include messaging, reporting, and work-order management. The mapping application displays vehicle locations in near real time using in-vehicle GPS receivers. Text messages can be sent to drivers using a Web-based, e-mail-like user interface; the messages are displayed on an in-vehicle monitor. The reporting application has a configurable, Web-based database reporting system that generates vehicle event reports, which can include location-related event data, driver-initiated messages, and changes in sensor inputs.

Onboard data systems provide the opportunity for waste operators to become more efficient, provide better customer service, and lower their operating costs. As noted earlier, the penetration of these new technologies is still relatively small in the waste management field. As the systems become less expensive and even more advanced, however, many more waste operators will discover the benefits of onboard data systems and adopt these systems within their own organizations.

Guest author Thomas M. Roth, P.E., is a geological engineer with Parson's Engineering Science in Atlanta, GA.

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Although only a small fraction of MSW collection trucks have a computer onboard, more and more MSW fleet managers are becoming intrigued by the possibilities that onboard computers and wireless communications offer for efficient route management.

By Charles D. Bader

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Incongruous as it might seem, given the complexity and cost of packers and transfer trucks, only about 5% of currently operating refuse trucks are even equipped with onboard scales, let alone onboard tracking, location, and automated communication systems.

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That situation might be changing, though, as a determined group of suppliers that has been supplying the transportation industry turns its attention to the MSW hauling market. Armed with experience and a steadily improving technology, these suppliers are adapting their onboard scales and/or global positioning system (GPS) location hardware and proven software to the unique requirements of MSW haulers, promising an array of benefits if haulers integrate their onboard sensor data with their dispatch and accounting systems.

Onboard Scale Systems

To date, the principal use of onboard scales in MSW applications has been to optimize load weights of transfer vehicles

transporting MSW from transfer stations to landfills. "Electronic onboard scales are not new," points out Rick Talbot, marketing and sales manager for Vulcan On-Board Scales in Kent, WA. "They were introduced over 30 years ago into trucking applications where monitoring gross vehicle or payload weights was necessary but platform scales were not readily available."

Of course this is precisely the same situation that has developed in the MSW industry as near-in landfills have been replaced by larger regional landfills often hundreds of miles away. Talbot concurs, adding, "Transfer station operators are now under increasing pressure to reduce transportation costs by maximizing the weight of each payload, but at the same time not overloading the vehicle."

"Most transfer stations have certified in-ground scales on-site but often not at the loading area. Many operators who have tried scales in the loading pit have concluded that they are very difficult and expensive to keep clean and maintain. As a result, every transfer vehicle must line up to be weighed at the certified scale after loading. Typically, underweight vehicles are waved on unless they are grossly underweight. Overweight vehicles are either sent back to offload or, depending on the weight and risks, sent on. Most studies show that transfer vehicles are underloaded, on average, by 4% to 10%!"

Attracted by the potential of the "new" market, companies such as Vulcan, SI Allegheny, and Creative Microsystems are now aggressively marketing products to MSW hauling companies and municipalities. As shown in Table 1, there are a variety of different types of onboard scales from which to choose.

Table 1. Onboard Scale Options

Types of Onboard Scales		
Onboard Scale Type	Strengths	Weaknesses
Front Fork Scale	Ideal for bin weights Accurate	Only frontloaders GVW* needs all bin weights
Transducer on Front Arms	Inexpensive Relatively easy to install	Requires frequent calibration Accuracy is marginal
Body-Mounted Load Scales	Very reliable Ideal for payload	Installation takes 25-40 hr.

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On This

	weights	
Air Scales	Inexpensive	Only air suspensions
	Easy to install	GVW only
Suspension Transducers	Inexpensive	Requires frequent calibration
	Relatively easy to install	GVW only
* GVW = gross vehicle weight		
Application Guide		
Vehicle Type	Applications	Options
Frontloader	Bin weights	Front fork scale
		Body-mounted load cells
		Transducer on front arms
Frontloader	GVW/payload weights	Body-mounted load cells
		Suspension transducers
Rearloader	Bin weights	Body-mounted load cells
Rearloader	GVW/payload weights	Body-mounted load cells
		Suspension transducers
Rolloff	GVW/payload weights	Shear pins/hydraulic
		Suspension transducers
		Body-mounted load cells
Container Carrier	GVW/payload weights	Body-mounted load cells
		Suspension transducers
Transfer Truck/Carrier	GVW/payload weights	Load cells
		Air scales
		Suspension transducers
Source: Vulcan On-Board Systems		

Apparently, avoiding overweight fines is not the number-one payback; rather, it's optimizing the payload. Matt Chapman, equipment maintenance supervisor for the Palm Beach (FL) Solid Waste Authority, agrees, citing operational experience to that effect. "The scale at our transfer station is quite a distance from the loading holes. Therefore, our transfer trucks would have to drive to the scale, and if the weight wasn't right, they'd have to make a U-turn and go back to dump some off or add some on, depending on the weight discrepancy. Now, with onboard scales, we avoid having to make that U-turn and that would save that driver eight to 10 minutes. Since we send out about 200 truckloads a day, that would save us 1,800 minutes, or 30 hours a day. That's not the real savings, though. Rather than make that U-turn, drivers whose trucks were underweight as much as 5,000 pounds would just keep going. With the onboard scales, every truck goes out fully loaded, yet without the risk that we'd be fined for being overweight."

Based on data like these, Talbot has calculated that onboard scales on a transfer truck with an 80,000-lb. payload limit would pay for itself in just six months if only the cost of this underweight is taken into consideration (see Table 2). If other precluded costs (such as the cost of overweight penalties, the cost of weighing, the cost to readjust weights, and the cost of out-of-route miles) are included, payback could be achieved in as little as four months.

Table 2. Cost Considerations of Onboard Scales on Transfer Vehicles

Cost of Underweight		
1.	Legal gross weight in pounds	80,000
2.	Current average GVW in pounds (without onboard scales) Use at least 30 scale tickets	76,000
3.	Average tare weight in pounds Use at least 30 scale tickets	33,000
4.	Maximum payload in pounds (line 1 minus line 3)	47,000
5.	Average payload in pounds (line 2 minus line 3)	43,000
6.	Average payload shortage in pounds (line 4 minus line 5)	4,000
7.	Average loads per day for truck	3

8.	Average payload shortage per day in pounds (line 6 multiplied by line 7)	12,000
9.	Days worked in year	250
10.	Average payload shortage per year in pounds (line 8 multiplied by line 9)	3,000,000
11.	Extra loads per year in pounds (line 10 divided by line 5)	70
12.	Number of roundtrip miles to the landfill	100
13.	Number of extra load miles per year (line 11 multiplied by line 12)	7,000
14.	Cost to operate transfer vehicle per mile (includes allocated overhead)	\$2.00
15.	Cost per year per vehicle of extra trips to the landfill	\$14,000.00
Cost-Benefit Summary per Vehicle		
Cost of underweight per year		\$14,000.00
Cost of overweight per year		\$1,500.00
Cost of weighing per year		\$960.00
Cost to readjust load weights per year		\$1,320.00
Cost of out-of-route miles per year		\$3,000.00
Total annual costs of operating without onboard scales		\$20,780.00
Installed cost of onboard scale (range: \$2,000-\$9,000)		\$6,500.00
Cost per month of operating without onboard scales		\$1,731.67
Months for onboard scales to pay for themselves		4
Months for onboard scales to pay for themselves (only considering the cost of underweight)		6

Thus, the use of onboard scales on transfer trucks can yield a very attractive return on investment (ROI). The argument for using onboard scales on collection trucks is less persuasive, however - unless weight-based billing is permitted. Hence it is a political issue, not a technological issue. Richard Boyovich of Creative Microsystems in Renton, WA, makes that point when he describes the performance of his company's LoadMan.

"For frontloaders, LoadMan's proprietary microcomputer 'learns' the load-cell waveform as a function of the angle and position of the lift arm and the front forks relative to a tenth of a degree throughout the entire lifting cycle. The system weighs the

container in motion going up and then reweighs it in motion coming down, thus providing the net content of the container without stopping the front forks for the weight reading. The system completely ignores vibration and shock from running motors and measures the material regardless of where the weight is located in the container. Moreover, the system automatically compensates for out-of-level weighing conditions. As a result of these features, the system's weighing accuracy is typically within 1%."

Still, when pressed to detail benefits of onboard scales for refuse collection where weight-based billing is not used, Boyovich becomes much less quantitative. "The system provides easy access to critical information, allowing identification of unprofitable accounts and accurate measurement of set-out rates for new customers and in general shows which routes are or are not operating efficiently. In addition, the system provides the drivers with gross load information so that they know when to go to the tipping station without risking overweight fines. What's more, trucks operating at their legal axle weights reduce maintenance costs and increase their overall life."

That's all well and good, but it is weight-based billing that makes onboard scales really pay off for collection trucks. Today's systems overcome most of the traditional objections to weight-based billing. Not only are they virtually error-free, but their software can integrate with even a municipality's billing system. Therefore, without redundant keying, the municipality's utility can print the weight and the cost as just another line item on the resident's utility bill. For commercial accounts, the system (if supplied with an onboard printer) can deliver an immediate hard-copy invoice to each customer.

Even so, the widespread political resistance to weight-based billing continues to be a potent force to overcome. Jim Pickett of Toter, for one, doesn't see the situation changing soon. "We have a straightforward system for handling weight-based measurement and billing," he states. "We place a tag with a unique radio frequency identification [RFID] on each cart. When that cart is lifted, our onboard scale system weighs it, records that customer's RFID, weighs the cart again after it has been dumped, and subtracts that weight from the initial cart weight to produce a net refuse weight that the customer will be billed for.

"The weight will be very accurate too. Today any scale used for weight-based billing must meet standards set by both the National Institute of Science and Technology and the [National] Conference of Weights and Measures. To meet those standards, a scale weighing a container with up to 500 pounds must be accurate to a half pound at any weight, and the measurement

cannot be affected by the truck's being out of level, whether caused by a slope or a pothole.

"We have had a system we refer to as 'Garbage by the Pound' on the market since 1995. The scale system is relatively inexpensive, it is certified as 'legal for trade' by the federal government, and it is very simple to implement. However, we have found that the political barriers to weight-based billing are formidable. There is a popular opinion that low-income residents generate more garbage per capita so that switching from the traditional flat-rate billing would penalize them. As a result, Garbage by the Pound has not nearly realized its potential."

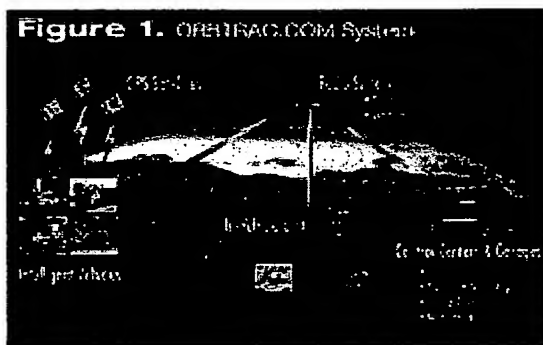
There are signs that Europe might be moving toward weight-based billing more rapidly than the United States. Mark Bottomley of PM On Board Ltd. in Bradford, UK, reports on this phenomenon: "Green/environmental issues are very big right across Europe. National governments are providing funding and hard targets for reducing waste to landfill and incineration. At the Kyoto summit, the 'polluter pays' principle was agreed as being the best way of reducing wastestreams. The problem is how to implement it. Now, weighing waste at the point of collection and billing the producer is being introduced in trial towns and cities. Just recently there has been huge trade and municipal interest. We have received dozens of inquiries that we have turned into orders."

While the US is not a party to the Kyoto Accord, Boyovich believes that a major switch to weight-based billing is inevitable in this country too because it would have such a strong positive impact on recycling and composting. If residents had to pay for what they put in their refuse cart, he argues, they would be much more likely to source-separate recyclables and compostables and thereby minimize their waste collection bills.

"And this impacts on the quantities of MSW going into landfills," he adds. "As the congressional hearings this summer amply demonstrated, states are concerned and want some control over the amount of waste material being imported from other states and, in a few cases, from out of the country. They see their landfills filling up at faster rates and are at last worried. However, if states ever hope to reduce the amount of waste material going into their landfills, they'll have to come up with a way to get people more motivated to recycle in greater amounts. I believe that the most practical way to achieve this today is through weight-based billing."

Location Systems

Location systems and



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software based on the GPS are attracting keen interest in the waste community. A number of different companies now are offering systems to waste companies and municipalities to increase the productivity of their fleets. A typical system is the ORBTRAC.COM system

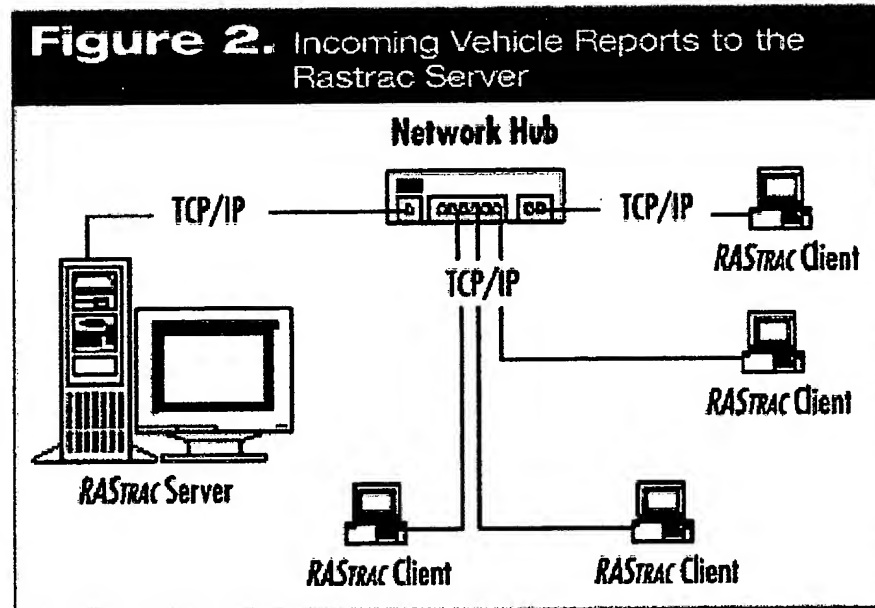
(see Figure 1) just now being marketed to the waste industry by Orbital Transportation Management of Columbia, MD. Orbital's Chris Body explains the system: "Users simply log on to the Internet from home, office, or vehicle and are connected to their fleet in real time. Using GPS satellite technology, the system will track the location and status of vehicles, helping to dispatch assets where they are most needed during daily operations. It also captures and stores data for postservice analyses to assist in reducing the overall cost of future operations."

Typically such an onboard data system consists of a processor, a differential GPS receiver, memory, a wireless communications modem, and sensor interfaces. Some systems add a display, a control unit, and even a mobile data terminal. The communication link can be a commercial two-way radio, a cellular telephone, a cellular digital packet data (CDPD), or even a low-earth-orbit communication system. To complete the overall system and link the onboard computer seamlessly with the home office dispatch and accounting systems, software packages have been developed and are being marketed by such firms as FleetBoss, @Road, and Rastrac.

Rastrac describes its system structure as follows: "A server provides a secure gateway through which clients can view their vehicle tracks. The server allows client users to see what the vehicles are doing now; and see what they have been doing just by choosing a date/time range. I/O processors [IOPs] collect incoming vehicle data from the wireless communication media [for example, radio, cellular, CDPD, or satellite] and present it onto the server network in a standard format, independent of the wireless medium over which it was originally transmitted. The IOPs act as information sources to the network.

"The server accepts all incoming vehicle reports [see Figure 2] and stores them on its local disk, keeping each vehicle's reports organized in a date-structured hierarchy of disk folders. Thus, it has the power to go "back in time" and instantaneously access vehicle data from days, months, and even years past at the

simple request of a client viewer. Moreover, since TCP/IP [transmission control protocol/Internet protocol] is also the protocol the Internet uses, clients [users] can view their vehicles via the Internet from anywhere in the world."



Thus, fleets ranging from a single vehicle to a large multilocation fleet can use a GPS vehicle location system. The question arises, though: Are such systems worth the money? Clearly there are significant benefits to be gained with such a precise vehicle location capability. Joel Smith of Clear Computing in Red Bank, NJ, describes some of the principal ones: "First of all, a fleet manager can optimize his routes. The fleet manager can pinpoint all customer locations as determined by the GPS data and then populate the waypoints on an electronic map display in his office. Then he can revise the routes of his trucks to make the overall collection more efficient. Thereafter, he can see if each driver is staying on his route and see exactly where each truck is located. If a truck breaks down, he knows exactly where it occurred, how many stops and lifts that truck had made, and where nearby trucks are located. Then he can make an informed decision as to the best way to service the customers on the balance of that route.

"Also, the dispatcher can deal effectively with customer telephone calls complaining that their refuse hadn't been picked up that day. The dispatcher can pull up that driver's route progress that day and inform the caller, 'Your truck picked up at your address at 8:14 this morning. Perhaps you hadn't put your cart out by that time. Would you like to authorize a special pickup?' Customer relations tend to improve when a hauler has hard facts at his fingertips."

Boyovich adds an ominous "benefit" to knowing exactly where every truck is at all times: "Since the system gives them a measure of driver productivity by knowing things like how long it took a truck to get to a tipping station, how long the truck was there, and how long it took to return to the garage, a dispatcher can quickly determine if a truck is 'lost' and how long it has been lost. That's important these days. Remember, the cavity of a packer is huge and could be filled with a large amount of explosives. What's more, if a terrorist group highjacks it, fills it with explosives, and drives it to a target site in the middle of town, they'd almost surely get away with it. People are so used to seeing collection trucks, no one would be likely to notice that it was in the wrong place until too late. But a dispatcher will know that a truck has gone missing and, unless the highjacker has disabled the GPS system, will know where that truck is and where it is heading."

Joe Anderson of Disposal Management in Des Plaines, IL, cites yet another advantage: "Our company is strictly a rolloff operation. Every order is, in effect, a custom order, so our trucks leave with only one or two orders in the morning. Therefore they have to call in for additional orders throughout the day. The problem used to be that when a truck driver called in, it took the dispatcher awhile to give him the orders that were closest to his current position, and he had to take the time to carefully spell out the address information so there wouldn't be an error. Therefore the dispatcher might well be tied up on one call while other drivers were waiting to get their orders. I know this doesn't sound like much, but now our GPS-based system enables our frequent dispatchings to be faster as well as more accurate."

Clearly a location system provides significant benefits, but what about the cost factor of the cost/benefit equation? Barry Grahec of Desert Micro in Jacksonville, FL, provides some insight into that elusive number: "We sell a turnkey system consisting of a GPS receiver, an onboard computer, a display, and our TruckManager software for \$4,300. And one of our customers who leased 10 of these systems ran an ROI analysis after 60 days. [Table 3 shows the ROI he calculated with the benefits based solely on labor savings.] Nothing for route optimization, nothing for customer relations - just labor savings and added revenues from the operation of five frontloaders and five rearloaders. The total cost savings plus added revenues was \$8,087 or \$404 per month per truck. Their one-time out-front cost was \$4,600 for the installation on the 10 trucks, and their recurring monthly system cost per truck was \$189 for the system lease and the wireless system - \$215 less than their \$404 monthly labor savings. Therefore they concluded that their out-front cost would be paid back in less than two years."

A more sophisticated ROI analysis is now being conducted by Western Disposal in Boulder, CO. Ten McNeilus trucks equipped with Cat/Trimble's CrossCheck CDPD mobile unit that gives GPS-generated position and records sensor inputs are being evaluated. This is one of the pilot programs McNeilus has in place throughout the country. According to Randy Bice, chief engineer for McNeilus Refuse Products, one of the major goals of these pilot programs is to verify that integrating Trimble's hardware with body and chassis networked data will minimize the need for and cost of redundant sensor information.

"In the Western test, there are six rear-load refuse haulers, two McNeilus frontloaders, and two McNeilus rolloff trucks outfitted with Trimble hardware," Bice reports. "There is one sensor on each of the McNeilus trucks, an ifm efector inc. proximity sensor that gives an indication when the forks are at about shoulder height. The rear-load trucks do not have added sensors, but the CrossCheck is connected to the indicator lights for PTO [power take-off] and for the rear can lift.

"The basic information being collected includes a 'popcorn trail' of truck locations collected once per minute and transmitted every 10 minutes to a Telvisant platform, and real-time events are transmitted immediately whenever the front fork passes the shoulder height position (on the rear-load trucks whenever the PTO is engaged, when it is disengaged, and when the rear lift operates). Finally, ignition on and off times are also reported in real time, as are stops and starts of the trucks and speeding events.

"Western intended the system to provide better information for route planning. Their going-in proposition was that they needed to save five minutes per day per truck based on optimizing their routes. What they immediately found was that the system saved them much more in driver compliance. Within the first week, they discovered almost an hour a day was being wasted by the drivers. As far as route planning goes, their evaluation is still evolving."

John Sowl of Western confirms that this Beta test evaluation is still proceeding and that final results are not yet in. However, he adds, "I think we'll be able to justify the system."

Table 3. Labor Savings and Calculated ROI With Location System

Activity	Impact
28 stops at \$35 each in generated revenue from proof we were at the site for the pickup and the	\$980

customer was charged to return to dump an extra.	
Savings from stops no longer missed due to driver mistakes (119 stops at \$18).	\$2,142
Generated revenue from 339 stops at \$6 each in extra residential stops picked up with same amount of labor and equipment.	\$2,034
48 stops at \$35 each in increased extras that are accurately billed as compared to 60 days previously when drivers were responsible for writing down extra charges.	\$1,680
39 hours at \$21/hr. in eliminated time drivers had spent on paper route sheets before and after each route.	\$819
16 hours at \$27/hr. in eliminated dispatch time to manually find closest truck and to radio the new stop and directions to driver.	\$432
Total Impact Over 60 Days (\$404.35 per truck per month)	\$8,087
One-time installation cost for 10 trucks	\$4,600
Recurring monthly service costs	\$189/mo.
Monthly operating savings (\$404.35-189.00 = \$215.35)	\$215.35/mo.
\$4,600/215.35	21-month ROI

Combined Systems

Judging from the interest being expressed by large fleet owners, it seems likely that some onboard data systems in the future will at least offer both scales and GPS tracking and a tie-in with other onboard sensors. Indeed, several vendors are offering such a combination right now. Of course, cost will always be a consideration in determining how much capability an MSW hauler can afford. That's the reason that Creative Microsystems's announcement that its price, installed, for a combined onboard scale and a GPS location system will total just \$8,000 for rearloaders and \$10,000 for frontloaders.

Boyovich breaks down that latter price as follows: "It will be \$7,800 for the onboard computer and software, about \$200 average for shipping, \$1,000 for the GPS receiver, and about \$1,000 for installation and training by our dealers. What's more, the basic system software will provide a seamless interface with any Windows-based office accounting system. And for customers who want to upgrade that basic system, we offer such optional capabilities as wireless communications at \$900, an onboard printer at \$500, and a barcode reader for \$500."

Is \$10,000 too pricey for this application? Will prices drop further as integrated, as opposed to modular, systems come on the market? Is price even the major barrier to widespread acceptance given the contention of Dan Lee of FleetBoss that the savings of fleet management using onboard computers goes right to the bottom line?

It is possible, even likely, that the McNeilus/Trimble pilot programs might answer these questions positively and chart the future of comprehensive onboard data system capability. If the large companies now Beta testing the system are satisfied and McNeilus goes ahead with its current plan to offer fleet management systems on all new products as an option, its competitors are likely to follow suit. And then these systems no longer will be exclusively aftermarket products. With that might come sufficient added credibility and downward cost and pricing pressures to make onboard systems a logical choice for far more MSW fleet managers than are buying them today.

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